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THE NATURE OF THE OCULAR LESIONS PRODUCED EXPERIMENTALLY BY NAPHTHALENE*

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IT may appear a strange digression from clinical ophthalmology to discuss the action upon the eye of such an unphysiological substance as naphthalene. It has long been known, however, that dosage with this substance is a convenient method for the experimental production of cataract, especially in rabbits, and as Burdon Cooper has pointed out (Doyne Memorial Lecture, 1922)—"Naphthalene cataract is one of the most important experimental cataracts, as of all the types it most resembles the subcapsular senile variety, and it gives us some indication where to look for the cause of the human disease." This view is being justified by the fact that recent investigations of naphthalene cataract, performed from the biochemical standpoint, have yielded results which suggest that naphthalene may produce its effects through a metabolic disturbance rather than by any specific toxic action. The comparison of these biochemical changes with any which may occur in human senile cataract has, however, yet to be made, in order to reveal any similarity between the two conditions.

The lens is by no means the only intra-ocular structure which is

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affected by naphthalene. Retinal exudates, the deposition of crystals in vitreous and retina, and changes in the ciliary body have also been described. In nature and variety they are of sufficient ophthalmological interest to merit description, since they do not seem to have been recorded by any other observers in this country. In addition, although they appear as the result of an artificial process they may add to our knowledge of the way in which pathological changes in one intra-ocular tissue may affect another, and as to how metabolic changes in the body as a whole may affect the eye.*

In order to bring our knowledge of the subject into a form available for reference, a brief review of the work of previous observers will be made as a preliminary to my own observations. The latter are the result of investigations on about sixty rabbits which were dosed with naphthalene and on which a number of biochemical investigations were made which will be recorded at a later date. Some of the rabbits which showed typical lesions have been demonstrated previously. (See *Proc. Roy. Soc. Med.*, September, 1929.)

In the second part of this paper an account will be given of certain features of the production and sequence of the ocular lesions, and of the nature of the retinal exudates and crystalline deposits.

Part I.—A Review of the Literature

The subject may be reviewed under the following headings:—

1. The development of cataract. 2. Retinal lesions. 3. Crystalline deposits. 4. Disturbances in the ciliary body. 5. General and metabolic changes.

1. *The development of cataract.*—A good description has been given of the changes which occur in the lens, and of the manner in which they vary. There was, in fact, a great variation in the times of onset of the lens lesions, and in the dosage requisite for their production. Thus Bouchard and Charrin (1886) obtained bilateral cataract in 20-25 days after a daily dose of 1·5 to 2 gm. of naphthalene, while Panas (1887) gave a larger dose of 3 gm. and still did not get cataract for a month. In striking contrast is the observation of Dor (1887) that lens lesions appeared on the 7th day after a daily dose of 1 gm., while Helbron (1889) records lens striae on the 2nd day after a total dose of 15 gm., and Magnus (1890) got the first opacity within the first 24 hours, after giving a large dose of 10 gm. to an old rabbit or 1 gm. only to a

* It is interesting to note that few human cases have been recorded, in which naphthalene was administered the rapeutically or was acting as an external irritant. Thus Lezenius (1903) and Caspar (1917) observed lens and corneal lesions and van der Hoeve (1907) found choroido retinitis.

young one. Michail and Vancea (1927) for routine experiments began with a daily dose of 1 gm. and increased it by 0·5 gm. each week, so that lens lesions developed in 12-20 days. They found that by keeping animals in the dark, or by sewing up the eyelids, the appearance of cataract was delayed.

Nearly all observers are agreed in their descriptions of the lenticular changes. There is an initial increase in volume of the lens, within a few hours after dosage, which causes irregularities in the anterior surface. Salffner (1904) has proved fairly conclusively that imbibition of fluid actually occurs, while Panico (1928) states that swelling occurs chiefly in the antero-posterior diameter. Both Salffner and Panico have found that lenses placed in the serum of naphthalinized animals show a greater increase in volume and weight than when placed in normal serum.

The swelling may be followed within 24 hours by the appearance of vacuoles radiating from the periphery towards the centre of the lens. These disappear quickly (Panico, 1928) and are followed by true opacity of the lens fibres which begins at the periphery and spreads through the cortex first and then through the nucleus. In the final stage the lens becomes milky-white and may develop grey or brown pigmentation (Panas, 1887, Michail and Vancea, 1927). The lens changes are usually complete within about 5 days from their onset, and advance simultaneously in both eyes.

It is the general opinion that cessation of the dose after lens changes have once begun, does not prevent their further development, but Panico (1928) states that complete retrogression may occur if the first two stages are the only ones present, *i.e.*, if there is no true opacity. Takamura (1911) found that a 5 per cent. solution of potassium iodide given to rabbits which had been previously dosed with naphthalene, had no preventive effect.

Histologically naphthalene cataract has been said to resemble senile cataract (Hess, 1887) and even diabetic cataract (Kolinski). Klingmann (1897) describes the separation of fibres by homogeneous material and the later appearance of vacuoles in the fibres. Salffner (1904) found proliferation of the inner layer of epithelium in the posterior capsule of the lens, while Panico (1928) states that the first changes occur in the anterior capsule—and lead to a subcapsular accumulation of fluid. The reader is referred to Busacca (1927) for a minute account of the histology of naphthalene cataract.

2. *Retinal lesions.*—The general description of the retinal exudates is rather vague, since their occurrence has not been emphasised. They seemed to appear first on the 3rd or 5th day as greyish-white globules, scattered over the retina. Each globule had a depressed centre which gave a bright reflex, while later they became confluent. (See Panas, 1887; Dor, 1887; Curatulo, 1889;

Kolinski, 1890; Ovio and Manca, 1896-8; Helbron, 1899; Igersheimer and Ruben, 1910; Takamura, 1911.) According to Dor (1887) the exudates retrogressed after cessation of the dose, and left small haemorrhagic areas in the retina so that the latter resembled the condition found in pernicious anaemia or leukaemia.

Igersheimer and Ruben (1910) describe another type of diffuse retinal exudate, which did not begin as isolated globules and could be identified histologically as an exudate between the pigment cell layer and the retina.

According to Panas (1887) exudates occurred (*a*) between the retina and vitreous, and (*b*) between the pigment cell layer and the rods and cones—thus causing localised detachments of the retina. The exudates consisted of albuminous fluid containing a large number of leucocytes. In addition there were a number of degenerative changes, viz., the appearance of cystic spaces among the nerve cells of the retina which were themselves degenerated and showed chromatolysis, while the ganglion-cells were most affected. In the late stage migration of pigment was said to occur from the pigment cell layer into other layers of the retina, while according to Kolinski (1889) and Takamura (1911) the optic disc was oedematous and infiltrated with leucocytes. The choroid was hyperaemic and showed degeneration and pigmentation in the later stages.

According to most observers (see Panas, Dor, Curatulo, Igersheimer and Ruben, Michail and Vancea, etc.) the retinal lesions preceded the lens changes—and Panas (1887) suggested that the latter were due to the lack of nutrition consequent on the atrophic state of the retina. Hess, Magnus, Helbron and Kolinski maintained that the lens changes were entirely independent and might even occur before the retinal changes.

Altogether there seems to have been no clear opinion as to the nature of the histological changes which correspond to those seen in the retina during life.

3. *Crystalline deposits.*—These have been described by Panas, Curatulo, Kolinski, Helbron, etc., as a deposition of bright crystals throughout the vitreous resembling *synchisis scintillans,* followed later by a deposition of crystals in masses on the retina, so that the latter resembles a " clear starry heaven." According to these observers they did not appear until at least three weeks after the initial dose. Snellen (1898) states that their appearance was inconstant, while Hess (1887), Igersheimer and Ruben (1910), Michail and Vancea (1926-7), Panico (1928) make no record of their appearance.

According to Kolinski the crystals have been seen histologically in every layer of the retina except in the rod and cone and inner nuclear layers. In one case, *e.g.,* in a rabbit which had been dosed over a period of 7 months similar deposits were seen in the cornea

and lens capsule. Kolinski found that the crystals in the retina were either needles, plates or prisms, arranged in spheroidal or plate-like groups. Little effort has been made to identify them—since Curatulo, Magnus, Helbron and other early observers were content with the conclusion that they must be naphthalene or failing that, cholesterol. Panas (1887), solely from their microscopic appearance, made the suggestion that they were calcium salts,—sulphates, carbonates, oxalates or phosphates, while Salffner (1904) thought that they might be a naphthalene derivative in combination with calcium.

4. *Disturbances in the ciliary body.*—Earlier observers laid great stress on the importance of the ciliary body to the nutrition of the eye, and were of the opinion that naphthalene cataract was entirely due to a disturbance in the ciliary secretion. (See Hess, Kolinski, Klingmann, Sala (1903), Peters (1902), and Lindberg (1922), etc.) Thus hyperaemia, small haemorrhages and vacuoles in the ciliary body have been described, while miosis seems to have been an early clinical feature (Igersheimer and Ruben, 1910). Peters has suggested that the aqueous humour becomes more concentrated, so that its salts and proteins are increased. In opposition to this hypothesis of the deleterious effect of concentrated salt solution on the lens *in vivo*, Salffner (1904) found that injection of a 25 per cent. salt solution into the ear vein of a rabbit did not affect the clarity of the lens. More recently Komura (1928) found a fall in intra-ocular pressure in rabbits after the administration of naphthalene and ascribed it to a defect in the ciliary secretion, since also, the aqueous humour which was regenerated after paracentesis, did not show an increase in protein content comparable with that which occurs in the normal animal. On the other hand, the changes found by Panas, Salffner, Takamura, Igersheimer and Ruben, and Panico were so slight that it is doubtful whether the defect in the ciliary body could be considered as the primary factor.

5. *General and metabolic changes.*—In the majority of cases which developed ocular lesions the animals remained quite healthy, but a few of the younger ones showed toxic signs which occasionally caused death before their eyes were affected. (See Hess, 1885; Magnus, 1890; Kolinski, 1899; Faravelli, 1893; Klingmann, 1897.) According to Igersheimer and Ruben (1910), these cases were exceptionally severe, but it is quite possible that the usual effect of the administration of naphthalene is either the production of a chemical toxin or a disturbance of the normal physiological balance in the body.

It is not proposed to enter fully in this paper into the chemical aspect of the problem, but the history will not be complete without a brief record of previous work of this type. Thus Bouchard and

Charrin (1886), Kolinski (1889), Salffner (1904), van der Hoeve (1907), Igersheimer and Ruben (1910), and Takamura (1911) have studied the effects of the administration of derivatives of naphthalene, while the metabolism of naphthalene in the body has been investigated by Bouchard and Charrin (1886), Penzoldt (1886), Lesnik and Nencki (1888), Filehne (1898), Edlefssen (1904), and Igersheimer and Ruben (1910), without producing any clear proof that the ocular lesions are produced by the toxic action of naphthalene or any of its derivatives.

More recently Kuwabara (1911), Takamura (1911), Goldschmidt (1917), Michail and Vancea (1926-7), Cade and Barral (1928), and Komura (1928) have studied the variation in different constituents of the blood following the administration of naphthalene.

Part II.—Experimental Work

In the first few experiments there was almost as much variation in the times of appearance and subsequent rate of development of the different ocular lesions as was recorded by previous observers. It was found to be due chiefly to the size of the dose used, especially of the initial dose (*cf.* Salffner, 1904), and to a difference in the animals—young rabbits being very much more susceptible than older and larger ones (*cf.* Magnus, 1890).

In order to standardise the effects as much as possible an initial dose of 3 gm. of naphthalene was given, in liquid paraffin, to an animal of 2-3 kgm. and was repeated daily until the lesions appeared. With this dose, it was usual for retinal exudates and early peripheral lens striae to appear within 24 hours, and this could be ensured if 3 gm. of glucose were given in addition. (The additive effect of the latter substance is probably due to the fact that it aids absorption. Glucose alone or with paraffin is quite innocuous.) Retinal exudates would generally proceed to a fully confluent stage without a further dose of naphthalene but in order to encourage the later development of a complete cataract, the dose was usually repeated for several days.

In contrast to Hess, Magnus and others, it seemed an invariable rule for retinal exudates to appear just before the onset of lens changes. On the other hand the lens often remained in the stage of early striae and never became opaque although the retina had become completely atrophic and detached. In contrast to Panas's suggestion (1887) such a maintenance of transparency would suggest that the lens nutrition is independent of that of the retina.

In a few cases a contraction of the pupil, which was unaffected by atropine, occurred within the first few hours. Usually the retinal exudates were the first noticeable change and they may therefore be described first.

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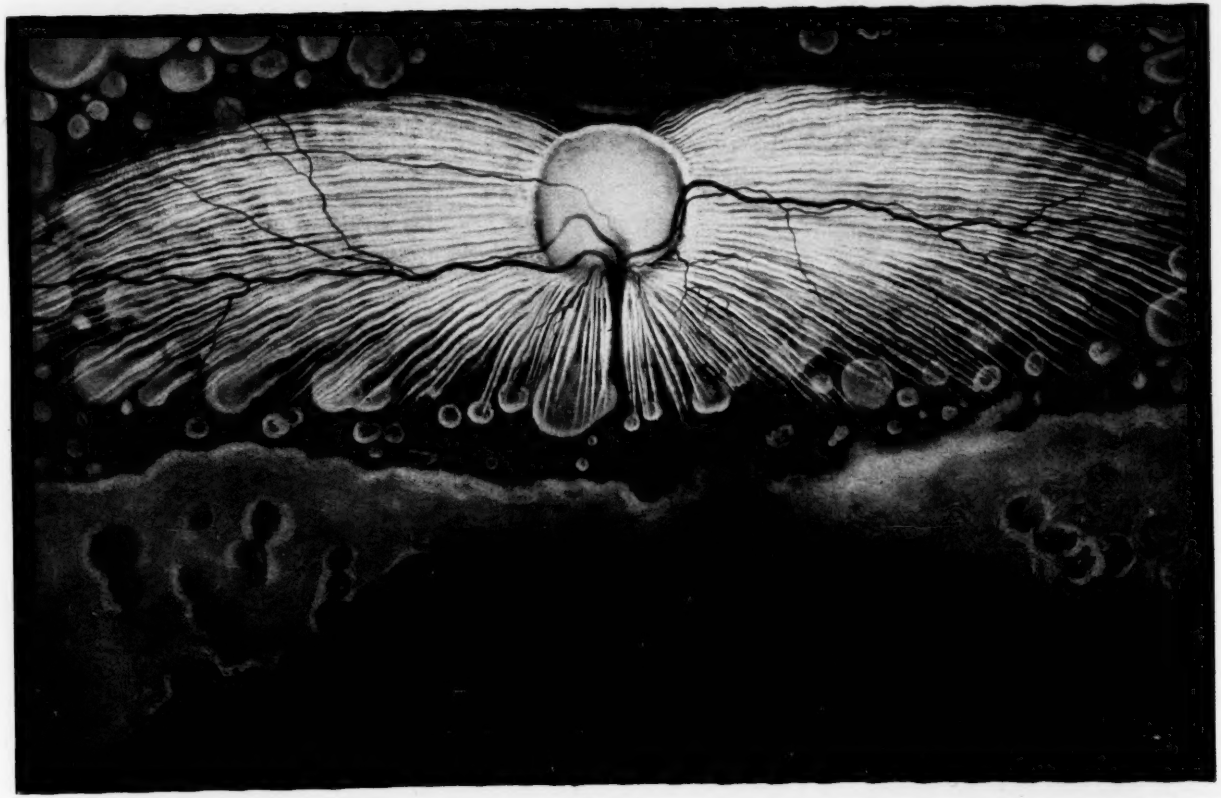

FIG. 1.

Retinal changes on 3rd day after the administration of 3 gm. naphthalene daily. Small exudates are seen near the optic disc, while large confluent exudates occupy the periphery. (Rabbit IV, weight, 2·8 kgm.)

Retinal Lesions.—They appear typically as small white spots at the extreme periphery of the fundus, and are often seen within 6-7 hours after the initial dose. They increase rapidly in size and number and spread in towards the optic disc. On ophthalmoscopic examination in this stage the globules reflect bright points of light, while within 24 hours they coalesce to form fluid exudates which are often so transparent that the choroidal vessels can be seen through them. (See Fig. 1.) In a few animals, especially young ones, the globular stage did not occur, but the whole retina was very hazy and oedematous. This was frequently associated with such a marked oedema of the orbital conjunctiva that the latter was raised up in folds, while the distortion of the lens probably from gross imbibition of fluid was such that it was impossible to see details of the fundus. This condition of oedema, which often seemed to affect the lungs as well, usually subsided on the third day, while the ocular lesions followed their ordinary course of development.

An examination was made of the eyes from a number of animals with the retinal condition illustrated in Fig. 1. It was usual to find a clear cornea, and a perfectly normal iris and anterior chamber. The lens was transparent but slightly swollen, and surrounded by a small subcapsular collection of fluid. Small peripheral radiating striae or vacuoles between the lens fibres were visible even through the intact capsule. In some cases on cutting into the substance of the lens and leaving it exposed to the air, it gradually acquired a golden tinge comparable to that seen in human senile cataract (*cf.* Gatti, 1905). Also the vitreous in these cases, on being removed from the eye was seen to have a yellowish colour and while at this stage it was still a gel, its consistency was not so firm as usual.

Small brown gelatinous areas in the retina were visible to the naked eye and appeared to correspond to the " exudates " seen in life. Sections were prepared by fixing the eye in Zenker solution and cutting either in paraffin or celloidin. As will be seen in Figs. 2 and 3 the retinal changes of Fig. 1 can be identified histologically. Fig. 2 shows two small areas corresponding to globular exudates occurring near the disc. The same section showed extensive changes also at the periphery corresponding to a large confluent exudate which was observed in life.

So far the retinal changes have been described as " exudates," first globular, and then confluent,—as these terms are best suited to their ophthalmoscopic appearance. Figs. 2 and 3 show that the affected areas in the retina are really localised patches of oedema. No albuminous or cellular exudates were seen between the choroid and retina (*cf.* Panas, 1887) nor was any other abnormality observed at this stage in the other tissues of the eye save a slight hyperaemia

of the ciliary body and choroid, and a few leucocytes deposited on the back of the cornea.

In sections stained with haematoxylin and eosin the oedematous areas stained poorly with haematoxylin, while the rods and cones showed a marked affinity for eosin.

It will be seen that the supporting cells immediately below the horizontal band of nerve fibres are swollen and broken down so as to form an irregular cystic space below the fibres. This space is filled by granular cell débris probably the remains of broken down ganglion cells. Similar débris is found on the anterior surface of the retina. The ganglion cells are much shrunken, are reduced in number and have small granular nuclei of about half the normal size. Numerous spaces are visible in both nuclear layers the nerve cells being fewer and apparently pushed apart by fluid. A number of cells in the inner nuclear layer show well-marked chromatolysis. The rod and cone layer is decreased in thickness and rather granular.

Atrophy of the retina rapidly follows the oedema. In 4-5 days the oedematous areas appear white. Usually the whole retina is affected, and is white and parchment-like. In a week or 10 days it may become detached, possibly through shrinking or because the vitreous becomes fluid and no longer supports it. The retina often splits horizontally above and below the bands of opaque nerve fibres, and the peripheral retina then floats forward into the vitreous in the manner shown diagrammatically in Fig. 4. In the course of 4-6 weeks the retinal vessels show a marked diminution in size until finally they may extend only a few millimetres beyond the disc. The choroid also becomes degenerated and heavily pigmented—while small fragments of atrophic retina may remain attached to it. The histological picture is one of marked degeneration. The layers of the retina can still be recognised but are vacuolated and ill-defined, while the choroid shows marked pigmentation especially in the vascular sheaths. There are deposits of fibrin and leucocytes on the inner surface of the retina, and on the choroid where the latter is exposed by detachment of the retina.

The development of cataract.—The changes observed in the lens need only a brief reference since they agree with those described by previous observers. An initial swelling of the lens is followed by the formation of radiating striae or fluid vacuoles at the periphery. The latter resemble the early striae in human senile cataract when they are examined in light reflected from the fundus. In the second stage which occurs in 2-3 days, the lens fibres themselves become opaque, first in the posterior cortex and then in the anterior cortex (see Fig. 5). The nucleus is the last part of the lens to become opaque, but in the final stage the whole lens is coagulated and yellowish-white in colour. The cataract usually

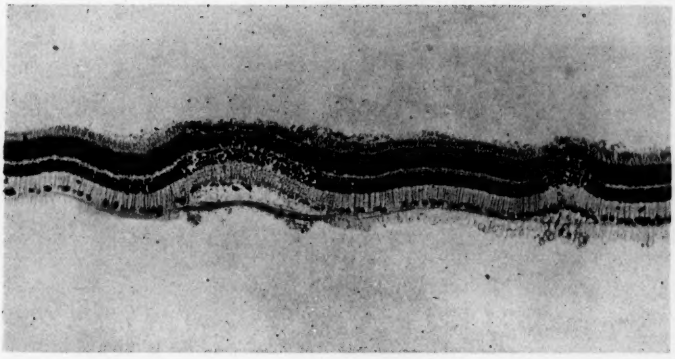

FIG. 2.

Section of retina showing two of the early exudates near the disc. (Rabbit XXX, weight 1·9 kgm. 24 hours after single dose of 3 grm. naphthalene.)

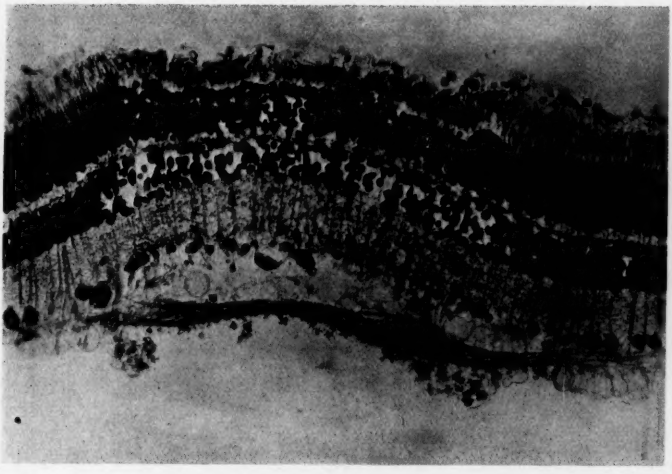

FIG. 3.

A magnification of the retina shown in Fig. 2. For description see text.

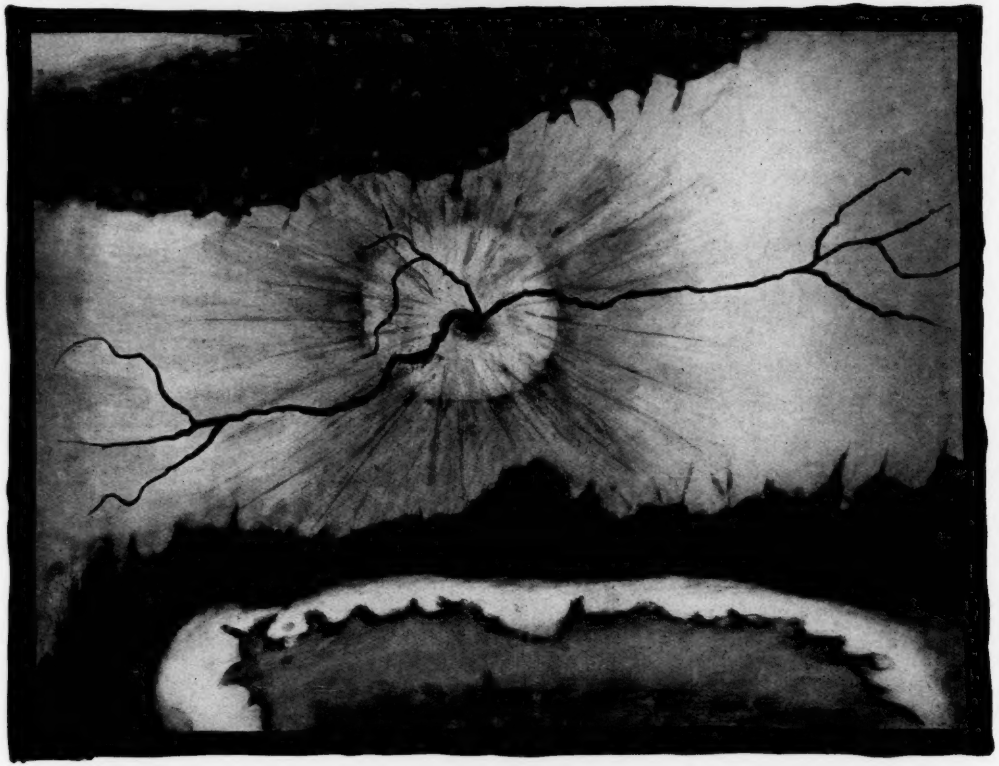

FIG. 4.

Final stage of retinal atrophy and detachment. Note horizontal splits in retina above and below the disc. (Rabbit IV, 14th day, *cf.* Fig. 1.)

FIG. 5.

The second stage of lens changes in the development of naphthalene cataract.

Final stage of retinal atrophy and detachment. Note horizontal splits in retina above and below the disc. (Rabbit IV, 14th day, *cf.* Fig. 1.)

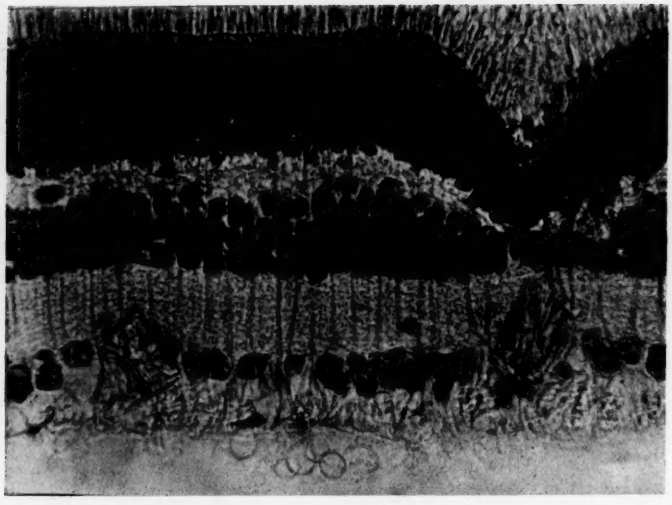

FIG. 6.

Crystalline deposits in the retina after repeated small doses of naphthalene. (Rabbit V, section ×650, stained haematoxylin and van Gieson.)

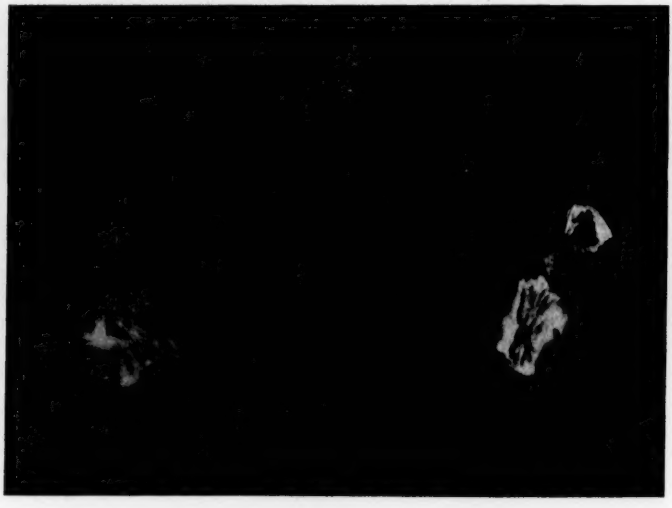

FIG. 7.

The same section as Fig. 6 viewed under crossed Nicol prisms.

becomes complete in about 14 days, and resembles a human senile cataract in the fact that all the glutathione, of which a normal lens has a considerable store, has been lost. It is difficult to discover the factors which lead to the completion of the lens changes, since the latter appear to be proportional neither to the severity of the retinal changes, nor to the extent nor length of time of the dosage with naphthalene. When once the second stage of true opacity has begun I have not seen any retrogression (*cf.* Panico, 1928)—but on the other hand further development does not always follow. It is hoped that a study of the biochemical changes will reveal the factors which influence the lens.

The deposition of crystals.—This is yet another phase of this interesting problem. Beyond the fact that the crystals did not seem to appear in less than three weeks, previous observers made no reference to the accompanying conditions. In my series of rabbits crystals were observed under the following conditions:—

1. In 2-3 weeks as the result of repeated small doses of naphthalene, *e.g.*, 0·5-1·0 gm. per day.

2. In 5-10 days in certain large healthy animals of 3·0 kgm. or over, to which the usual dose of 3 gm. naphthalene had been given daily.

3. Occasionally in healthy animals of average size, in which early retinal exudates appeared in 2-4 days and remained in this stage without any further progress, while a day or two later the deposition of crystals began.

When first seen, the crystals are very like *synchisis scintillans*. They are in the posterior layers of the vitreous and on the surface of the retina, and as dosage is continued they become deposited quite heavily in irregular plâques on the retina. The animals are always healthy and undisturbed by the naphthalene, while in types 1 and 2 the fundus, vitreous, and lens remain quite normal. In fact the deposition of crystals seems to be the ocular sign of an established resistance, or, of compensation to the effects of the naphthalene.

Crystals are found on the adjoining surfaces of retina and vitreous and are also visible in the sections of any retina which contained them during life. They occur chiefly in the ganglion cell layer and less often in the inner nuclear layer, and produce very little disturbance in the surrounding tissues. Occasionally the ganglion cells in the immediate neighbourhood are more palely stained and show slight chromatolysis. As will be seen in Figs. 6 and 7 the retina may be kinked at the point of deposition, with a scattering of the cells of the outer nuclear layer. It is probable that the latter is a mechanical disturbance produced in the cutting of the section.

The nature of the crystals.—They are doubly refractile (see Fig. 7), colourless, 4-sided plates of irregular shape which occur in rosettes or overlapping one another in groups. As might be expected from the fact that they are resistant to all the reagents employed in the preparation of the sections, the crystals were found to be inorganic, thus suggesting that naphthalene can indirectly cause a disturbance of the normal physiological constituents of the body fluids, so as to lead to the deposition of some inorganic salt. From this point of view it was considered worth while to investigate the nature of the crystals. After having excluded the possibility that they were derived from any external reagent, their reactions were found to be as follows:—

1. On being heated on the warm stage of a microscope to 195°C., the crystals were quite unchanged. At higher temperatures they fused to an amorphous residue.

2. *Solubility.*—Insoluble in all organic reagents. Readily soluble without effervescence in weak sulphuric (1-3 per cent.) and nitric acids, and less rapidly in hydrochloric acid. Soluble in cold saturated cupric acetate. Insoluble in hot or cold water, acetic acid, oxalic acid, ammonium hydroxide and caustic alkalies.

3. Tests for sulphates, sulphides, carbonates, phosphates, amino acids, uric acid and such tests as were possible microscopically for ordinary metallic radicles (except calcium)—were all negative.

4. A test for calcium by irrigation with H_2SO_4 and 40 per cent. alcohol yielded fine needles characteristic of calcium sulphate.

A number of minor tests were also performed.

It is admittedly difficult to obtain a convincing proof from chemical tests which have to be performed under the microscope—but the appearance and behaviour of the crystals is such as to lead to the conclusion that they are undoubtedly calcium oxalate. In confirmation of this it may be mentioned that they exactly resemble the illustrations given by Krause (1926) of deposits *in vivo* of calcium oxalate in human renal epithelium in a case of oxalic acid poisoning; and in the duodenum of rabbits to which oxalic acid had been given. I have myself seen exactly similar deposits in a rabbit's kidney after repeated small doses of oxalic acid.

Conclusion.—It would be fallacious to attempt to find an adequate explanation of the action of naphthalene merely from the character of the ocular lesions to which it gives rise. Although at first they appear to be so diverse that it would be impossible to attribute them to any one causative factor, yet they present certain features which suggest that they may all be due to a disturbance in the normal balance of the inorganic constituents in the body, rather than to any direct toxic effect of naphthalene or its derivatives. For instance, the early change in both lens and retina is an imbibition

of fluid, and this process may be associated with oedematous changes in other parts of the body. As an alternative, there is the deposition of an inorganic substance in crystalline form, a type of pathological change which occurs comparatively rarely, *e.g.*, in atheromatous deposits, calculi, *synchisis scintillans*, and which is dependent on certain specific conditions such as acidity, alkalinity or hypercalcaemia, etc. A knowledge of the particular factors which determine the extent to which any or all of the ocular changes shall occur after the administration of naphthalene, can only be gained by a more thorough investigation of the accompanying biochemical changes than has been attempted up to the present.

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KERATITIS SICCA

BY

W. S. DUKE-ELDER

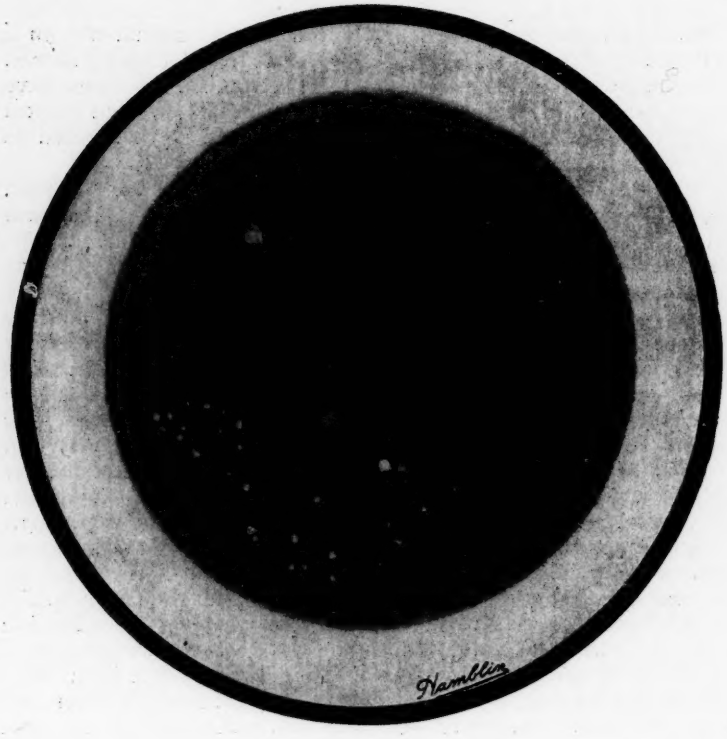
LONDON

THE occurrence of a dystrophy of the cornea associated with a deficiency of lacrimal secretion appears not to be of very common occurrence. The fact, however, that a number of cases have appeared in the literature showing a similar or a related clinical picture, suggests that such a condition should be recognized as a well-defined clinical entity.

The following case seems illustrative of the condition. A child, aged five and a half years, appeared at the out-patient's department at Moorfields Hospital complaining of chronic photophobia. The boy was one of a family of three, the others of which were in every respect normal. The child himself was perfectly developed mentally and physically, except that his mother gave a history of complete absence of tears since birth. She gave a history also of the presence of a viscous sticky secretion on the lids when the child was very young, but which for the past year or two had not been evident. It appeared that the child had never wept, although he was accustomed to rub his eyes continually, and, when crying, complained of pain over them. The photophobia appeared to have been very marked indeed during the first two or three years of life, but was now less disturbing. Examination showed that, apart from the condition of the corneae, his eyes were normal, with good vision (6/9 with correcting glasses) and with normal corneal sensation. Situated in the deeper layers of the epithelium and in a few instances involving the superficial part of the substantia propria there were considerable numbers of punctate opacities of each cornea; some of them were large and diffuse, while others were small and discrete. They were more numerous in the lower segment of the cornea, where they were interspersed with a few short tenuous linear opacities. The child's eyes were dry, and the secretion of tears as measured by Schirmer's blotting paper test (1903) gave a subnormal result, while their reflex stimulation by strongly smelling substances was similarly subnormal, although subjective evidences of discomfort during this test were by no means lacking.

I have been able to trace three other cases of congenital absence or deficiency of lacrimal secretion in the literature (Coppez, 1920; Kayser, 1921; and Ishikawa, 1928). In the first of these three there were other congenital deformities associated with the eyes (epicanthus and ptosis), and it was assumed that the lacrimal gland was either hypoplastic or absent; the conjunctiva, however, was

relatively normal and the cornea was clear. Ishikawa's was of a somewhat similar nature, although no other congenital deformities were present: there was much photophobia, blinking was frequent, and although the conjunctiva was hyperaemic, the cornea appeared



again to be normal. Kayser's case was somewhat anomalous, for the condition was accompanied by a congenital trigeminal palsy which appeared to be of central origin. The cornea was insensitive, and was scattered over with infiltrated opacities, which eventually broke down and led to a perforation with a prolapse of the iris and the development of a hypopyon ulcer. It is probable that the changes in this last case were largely due to "neuropathic" influences (whatever that may mean); and consequently the literature appears to contain no uncomplicated instance of the congenital occurrence of a lacrimal deficiency giving rise to a keratitis as appears to have occurred in the present case.

There are, however, several cases of a lack of lacrimal secretion developing after birth which appear to bear a very close analogy to the present one. Cases of such a nature which have been reported in the literature may be divided into two groups.

1. The first to draw attention to such a picture in the cornea was Wagenmann (1893-1902), who reported two cases resulting from injury. The first was a case of a fracture of the base of the skull which was followed by a failure of the secretion of tears, uncomplicated by a trigeminal paralysis. The second followed an excision of the lacrimal gland undertaken on account of suppuration. The corneae showed opacities having a punctate distribution which were associated with filaments and with thickenings and indentations of the epithelium. Avizonis (1928) reported a somewhat similar filamentous condition after operative removal of the lacrimal gland. Engelking (1928) reported two similar cases: in one, the lacrimal gland was removed for a cirrhotic tuberculous condition, with the result that a typical filiform keratitis developed almost immediately; the second case was less typical. An operation for empyema of the frontal sinus was followed by ptosis, a lack of the upward movement of the globe, and very severe pain. The severity of the pain led to procedures being undertaken for the destruction of the first division of the trigeminal nerve, and five years later to excision of the Gasserian ganglion. This was followed by complete insensitivity of the cornea and cessation of lacrimation, the clinical picture showing numerous punctate defects and a large central ulcer but no filaments.

2. The second group of cases has been reported occurring spontaneously in women after the period of the climacteric (A. Fuchs, 1919; Schöninger, 1924; Scheerer, 1928; Betsch, 1928; Ishikowitz, 1928). In most of these cases a failure of lacrimal secretion involving dryness of the eyes and accompanied by more or less marked photophobia had been evident for some years, commencing after menstruation had ceased. In many of them a somewhat similar defect in secretion involved the salivary glands of the mouth and the sweat glands of the skin. The usual clinical picture was that of a chronic conjunctivitis showing velvety papillae, and characterized by a tenacious secretion containing epithelial cells, while in the cornea punctate opacities and sometimes filaments were evident, limited especially to the lower periphery. In one or two cases, also, a periodic swelling of the parotid gland had been noted.

It would seem, therefore, that such a keratitis associated with punctiform opacities, sometimes with filaments, and usually accompanied by a chronic conjunctivitis characterised by a small amount of viscous secretion, can be definitely associated with the lack of tears, no matter in what manner this deficiency of secretion is brought about, whether (*a*) congenitally, (*b*) after trauma or

operation, or (*c*) spontaneously in women after the period of the climacteric. This would seem to indicate that the mucous secretion of the conjunctiva is not sufficient to keep it adequately lubricated; and the series of cases reported by Avizonis (1928), wherein prolonged kerato-conjunctival irritation followed an excision of the upper fornix, seems to bear out the fact that such an operation (*e.g.*, in trachoma), or a removal of the lacrimal gland in epiphora cannot always be undertaken with impunity. In addition to the lack of tears the occasional association of this condition with paralysis of the trigeminal nerve, and its frequent association with deficiency or dysfunction of the endocrine glands is of interest.

It is noteworthy that the keratitis is frequently associated with the presence of epithelial filaments; but again it is to be remembered that this is not invariably the case. In the present case none were evident, but this does not exclude the possibility of their having been present at an early period when a tenacious and viscid secretion seems to have been a pronounced feature. In any case it is probably best to regard the formation of filaments as a secondary result of the epithelial lesion. Recent continental authors in describing the condition have referred to it merely as a "filamentary keratitis"; but in addition to the fact that filaments are probably an incidental rather than an essential feature of the disease, this term is applicable to many other conditions, occurring after abrasions, wounds, and herpes of the cornea, and in absolute glaucoma, while it appears to be definitely associated with arthritic conditions, especially those which are presumably of polyglandular aetiology. These have been recently annotated by Houwer (1928), and it is interesting that in one of the cases of the present series (Isikowitz), the patient was a woman of fifty-three years of age who showed a typical picture of filiform keratitis, and had, in addition to a complete absence of lacrimal secretion, an arthritis of both hands and feet which was attributed to an endocrine origin. It is probable that these cases are nearly related to those of group II above. For these reasons it seems preferable to regard the condition associated with a deficiency of lacrimal secretion as a clinical entity, and, rather than give it a name descriptive of one of its clinical characteristics (which may not be an invariable feature, and certainly is not a distinctive one), to refer to it in terms of what appears to be the most important factor in its aetiology—keratitis sicca.

As this paper is in press a second case (aged 4 years) of congenital absence of the lacrimal gland with lack of tears has come under my notice through the courtesy of Mr. H. D. Gillies. There was a chronic conjunctivitis with velvety papillae and a viscid secretion, but the cornea appeared normal although slit-lamp examination was impossible. The case was complicated by marked ptosis and epicanthus with a failure in the development of the derivatives of the medial nasal process. It therefore comes into line with the case of Coppez, and forms the fifth case of this condition. It may be that the immunity of the cornea in this case (as in that of Coppez) was due to protection by the ptosis.

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HAEMANGIOMA OF THE ORBIT

BY

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M. H., female, single, aged 40 years, an English school-teacher, was admitted as an in-patient to the Royal London Ophthalmic Hospital on June 21, 1929, and gave the following clear history :—

Five years ago while in South Africa she noticed that her left vision was blurred and she at once consulted an oculist in Durban who advised dental treatment which was carried out. Despite treatment the sight of the left eye gradually deteriorated, so last year while in New Zealand she again saw an eye specialist who said she had scleritis and changed her glasses. This year her vision became so bad that she returned to England for further advice. Her general health has always been good.

On Examination :—There was a fairly extensive capillary naevus of the left side of the face, a portion of which is shown in Fig. 1.

Right eye—normal.

$$R.V. \text{ with } \frac{+0.75 \text{ sph.}}{+0.50 \text{ cyl. ax. } 70°} = 6/3.$$

Left eye.—There is considerable generalised dilatation of the scleral vessels, with deep purplish coloration of the sclera near the

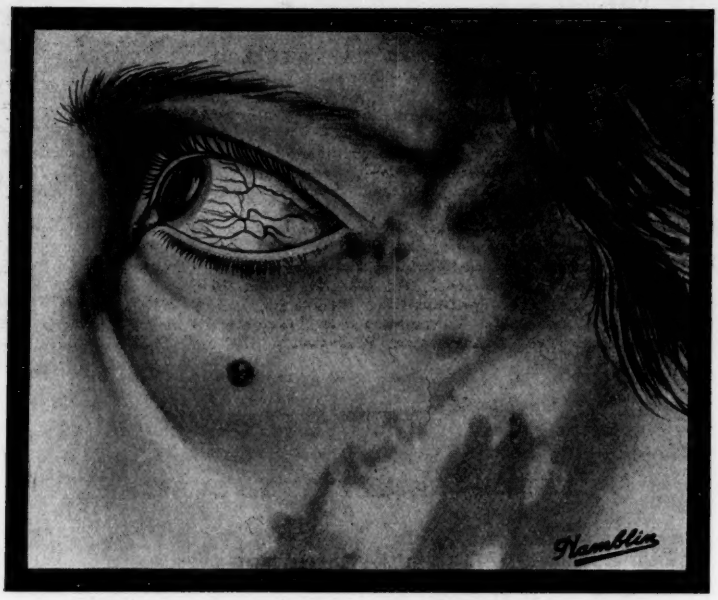

FIG. 1.

equator (Fig. 1). There are no precipitates, the cornea is bright, the pupil is active and dilates regularly, the lens and vitreous are clear and the tension is normal. There is marked oedema of the retina centrally and especially along the upper nasal vessels. The edges of the disc are blurred by the oedema while there is obvious pigmentary degeneration of the macula as shown in Fig. 2. The retinal veins show slight engorgement and in the periphery there is some nipping of the smaller arteries by the veins; this nipping is not illustrated in Fig. 2. There is no proptosis, nor is there any defect in ocular movements.

L. V. = counting fingers at one metre.

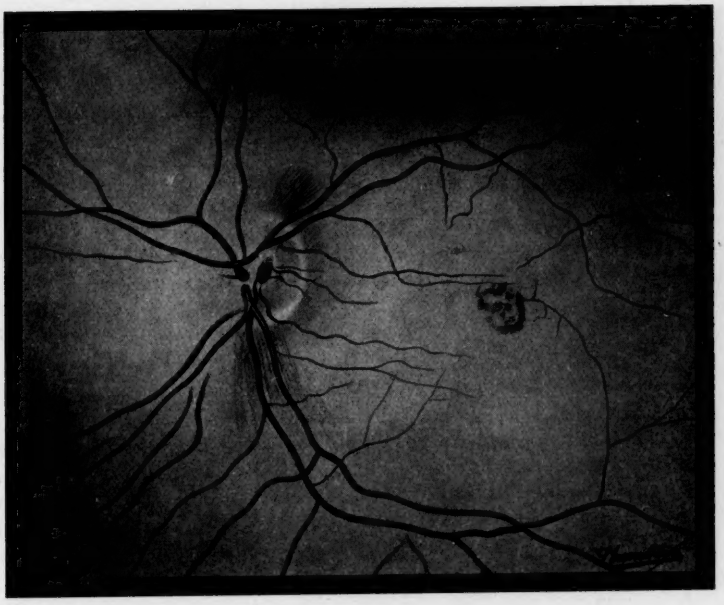

FIG. 2.

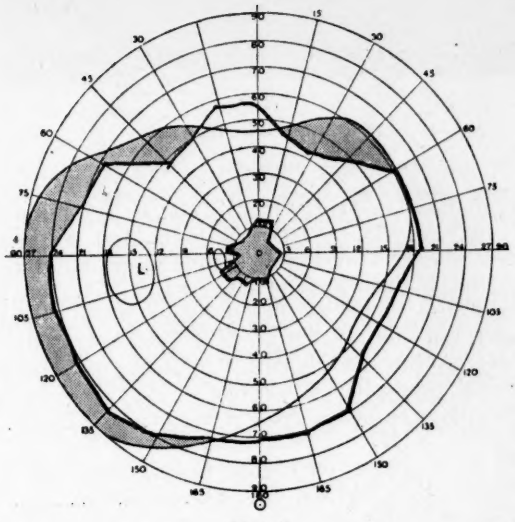

FIG. 3.

Visual Fields.

Left. *White.*—Large absolute central scotoma but no peripheral constriction. (Fig. 3.)

Colour.—No perception of red or green throughout the field.

Right. *White* } Normal.
Colour }

Wassermann Reaction.—Negative. *Urine.*—Negative. *Teeth.*—X-ray is negative. *Ear, nose and throat.*—" No evidence of infection." *X-ray orbit.*—" Slight increased density of left as compared with right orbit." *Optic foramen.*—" No apparent abnormality." *Skull.*—" No abnormality. In the antero-posterior view the greater density of the left orbit is also shown.

General Examination.—Negative.

The patient was seen by all the members of the staff, and although they were not unanimous as to the diagnosis, yet several of them considered that, in view of her family naevus and the X-ray report, she had a naevus of her choroidal and orbital vessels causing slight back pressure which was exhibited in her sclera by engorgement of the vessels and in the retina by oedema. They were unanimous that no further treatment was indicated.

I have to thank Mr. Duke-Elder for permission to publish this case.

ATYPICAL COLOBOMA AND VASCULAR ANOMALY

BY

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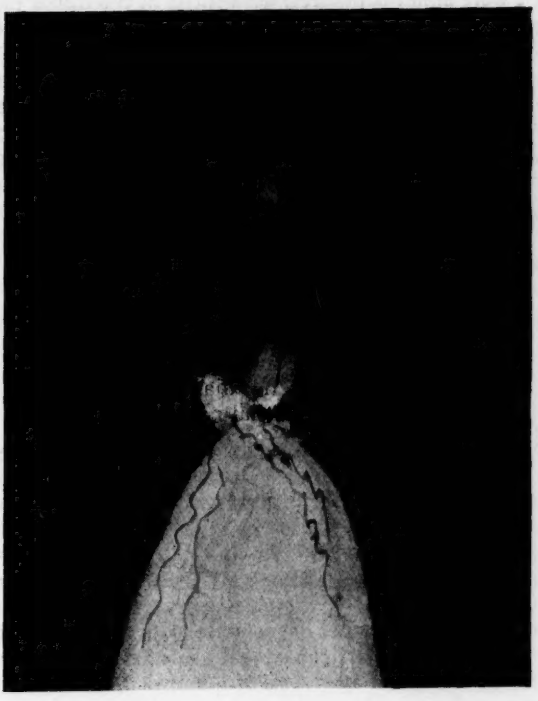
THE paper published in THE BRITISH JOURNAL OF OPHTHALMOLOGY, December, 1929, p. 608, by Drs. Ida Mann and Jas. A. Ross has been of great interest to me as it recalled to my mind a somewhat similar case which I saw at the Glasgow Eye Infirmary in 1904.

I made a rough sketch of the condition at the time and some months later sent the sketch to Mr. Treacher Collins for his opinion. Mr. Collins considered the sketch as probably representing the clinical appearance which one would have seen in his case of microphthalmos shown in section in plate IV, *Trans. Ophthal. Soc. U.K.*, Vol. XIII.

I kept the sketch beside me hoping to get something like it some day to publish with it, but nothing just similar has been seen until I read the paper in this journal last month. The case of which I



enclose a sketch was that of a young man who came to see if his right eye could be assisted by the use of spectacles. He had fairly good vision in this eye, 6/12 when corrected. There was no outward evidence of malformation of the eye or other parts. The left eye was quite normal.

The appearance in the fundus was that of a large coloboma of the choroid with a small band of normal appearance above it. Above the normal band was what appeared to be a small optic nerve entrance with a large ectasia upwards. Blood vessels extended in two regular groups, one to the right, one to the left, each containing an artery and a vein. A small vessel extended up along the ectasia and branched.

About a disc's breadth above the upper extremity of the ectasia there was another optic nerve entrance of moderately normal appearance. The principal departure from the normal was the

distribution of the blood vessels. The veins and arteries at the lower part were small compared with those at the upper part. The vessels all seemed to come more from the nasal than the central part of the nerve.

There was no other congenital abnormality in the eye and there was no spot of choroidal or other disease at any part of the fundus.

I formed the impression, at the time, that the condition might be due to, or connected with, an unusually placed division of the central retinal artery and vein coincident with, perhaps connected with, the late closure of the choroidal cleft.

ANNOTATIONS

Ophthalmic Benefits*

Ophthalmic surgeons have taken comparatively little interest individually in ophthalmic benefits and in the various administrative schemes which have been proposed. Now that the valuation period of the Approved Societies is rapidly approaching it is more than probable that there will be an increase in number of the societies who will give this additional benefit. It originally arose as the result of some of the societies wishing to provide their members with glasses to correct errors of refraction, and when first instituted by them was called an optical benefit and was administered under the clause in the Insurance Act which provides for instruments. The patients were for the most part sent to sight-testing opticians who provided them with glasses. Mainly as the result of a repre-

* The following are the Ophthalmic bodies interested.

Council of British Ophthalmologists.

Body constituted by a meeting of British ophthalmologists who hold an annual meeting and elect a Council.

The Council is composed of Presidents and Past Presidents of the Ophthalmological Society of the United Kingdom, the Section of Ophthalmology of the Royal Society of Medicine, and the Oxford Ophthalmological Congress, together with elected representatives from these bodies.

The Ophthalmic Committee of the British Medical Association appointed by the Council of the B.M.A., and composed of ophthalmic surgeons with affiliated members from the other sections of the B.M.A., together with three members of the C.B.O. (a recent concession).

Association of Dispensing Opticians.

A recently formed Society of Dispensing Opticians for their members' welfare.

National Ophthalmic Treatment Board. (N.O.T.B.) Consists of three representatives from the B.M.A., and three representatives from the Society of Dispensing Opticians together with the secretary of the B.M.A., and the secretaries of the Dispensing Opticians.

? Provision made for Insurance Societies.

sentation first, by the Council of British Ophthalmologists and secondly, by the British Medical Association, the name of the benefit was changed to an ophthalmic benefit, and some of the societies issued a letter which provided a fee of one guinea to the ophthalmic surgeon (who saw the patients at his residence) and a contribution towards the cost of spectacles. Other of the societies continued to send their cases to sight-testing opticians and sent them to ophthalmic surgeons only if the sight-testing opticians advised it. As the funds of most of the societies did not allow of paying a fee of one guinea to the ophthalmic surgeon in all cases, the ophthalmic surgeons as represented by the Council of British Ophthalmologists and the British Medical Association agreed to see these patients for half a guinea if they were seen at a clinic.

At the present time there are three bodies of the medical profession who are attempting to organise clinics for this purpose, the Ophthalmic Service Ltd., the British Medical Association and the Ophthalmic Hospitals of London. Of these bodies it is obvious that the British Medical Association has at present far better machinery to effect the necessary arrangements. The scheme which they have put forward is one which was suggested to them originally by the dispensing opticians. It consists in the establishment of what are termed home clinics, in which the patient is seen at the consulting room of the ophthalmic surgeon, and of central clinics which have a centre in the district where patients are seen in a clinic set up and financed by a dispensing optician. The appointments in both cases are made by the opticians who also collect the fees for the ophthalmic surgeon. The management is under a joint committee of members of the British Medical Association Ophthalmic Committee and of dispensing opticians and is called the National Ophthalmic Treatment Board. The expenses of the National Ophthalmic Treatment Board are defrayed by a Guarantee Trust known as the Thayer Trust which is at present guaranteed by dispensing opticians and in which the British Medical Association hope to take a part. The central clinics are set up and paid for by the individual optician at his own risk and have nothing to do with the guarantee put up in the form of the Thayer Trust. The Council of British Ophthalmologists have raised a strong objection to the scheme put forward for the management of the central clinics. They think it is derogatory that the ophthalmic surgeon should be dependent on the optician for finance and also consider that the arrangement for the consultation should be directly between the surgeon and his patient without the intervention of the optician. The ophthalmic hospitals of London have met together and have approached the societies and Ministry of Health with a view to holding clinics at the hospitals for insured patients. The scheme has been favourably received and it is hoped

will be extended to the ophthalmic departments of other hospitals and to the provinces. The surgeon who advises the patient is to receive the fee for consultation. The great advantage of this scheme is that it would be less expensive to manage, a more efficient staff would be obtained and a proper supervision would be given to the clinic. It is unfortunate that the British Medical Association scheme and hospital scheme cannot be so modified as to work in conjunction with each other. It is obvious that the majority of ophthalmic surgeons, at any rate in London, would not agree to work under the conditions of the British Medical Association scheme, at rooms or shops set up by an optician at his own expense.

Elementary Ophthalmic Ethics

We understand that a circular letter has been addressed to ophthalmologists by the Secretary of the British Medical Association, calling attention to the fact that, according to information received, " a body of sight-testing opticians is circularising registered medical practitioners who practise as ophthalmic surgeons inviting them to place their names upon ' a Register of ophthalmic surgeons for the use of Approved Societies in cases which, having been examined by a qualified optician upon the register of the Joint Council of Qualified Opticians, were referred for further advice or treatment.' This list is to be compiled by the Sight-testing Opticians' Society upon the recommendation of local sight-testing opticians."

The secretary of the British Medical Association points out that there is " already in existence a list of approved ophthalmic medical practitioners prepared by the British Medical Association, printed and issued by the Ministry of Health. This list is furnished to Approved Societies and other responsible persons on request."

The secretary of the British Medical Association emphasises the fact that any medical practitioner allowing his name to be placed upon such a list, prepared by a lay body for the use of other lay bodies, is liable for grave reflection cast upon his character for a breach of professional ethics. " Such action," he says," cannot but be regarded as an undesirable method of gaining introductions to patients." This is a fact which is patent to all responsible medical practitioners, and needs no further comment from us.

JUBILEE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM, 1930

PROVISIONAL arrangements have been made for the Fiftieth Anniversary Meeting of the Ophthalmological Society from April 2 to 5, 1930. The Royal College of Surgeons is inviting members of the Society to a Reception at the College of Surgeons, on Thursday evening, April 3. By the courtesy of the Fishmongers' Company the Banquet will be held in the Fishmongers' Hall on Friday evening, April 4. The Bowman Lecture will be given by Sir Arthur Keith. His subject will be " The Genius of Sir William Bowman." The lecture will be given on the Friday afternoon at 5 p.m.

The subject of general discussion is " Disorders of Secretion of the Endocrine Glands associated with Eye Diseases " and will be opened by Mr. J. H. Fisher, Prof. H. Maclean, Dr. W. Clarke Souter and Prof. E. C. Dodds.

It will greatly facilitate the work of the Secretaries in making arrangements if members of the Society will intimate, as soon as possible, whether they intend to be present on this occasion, how many tickets they would like for the Reception at the College of Surgeons, and whether they wish to be present at the Banquet. It is probable that a certain number of tickets will be available for ladies as guests of members.

A number of distinguished foreign guests have been invited to attend as the guests of the Society and many of them have already sent in acceptances.

TREATMENT OF RETINAL DETACHMENT

THE treatment of " spontaneous " or " idiopathic " detachment of the retina in the past has been a disappointing matter in the experience of the vast majority of ophthalmic surgeons. Therapeutical and operative treatments have resulted in such a small percentage of cures, that one has at times been inclined to try any new method from which a cure is reported, but the resultant cynicism has tended to an impassive fatalism.

Good news from Switzerland concerning a new method of surgical intervention holds out hope of a lasting cure in quite a high proportion of cases. This method is due to J. Gonin, of Lausanne, who spoke at the Holland Congress of some of his cases in which the retina had remained *in situ* and had retained good vision three years and more after reposition. The effectiveness of his method has been endorsed by others who have made trial of

it, especially his Swiss colleague, Vogt, and his workers, Amsler and Dubois, whilst Arruga of Barcelona spoke enthusiastically of the method and claimed 50 per cent. of cures in favourable cases. Other speakers at the Holland Congress also spoke in the same vein.

Such a widespread expression of approval has not been elicited by any method of treatment previously put forward, and Mons. Gonin is to be congratulated on the consummation of his many years of painstaking work on this subject. Even if the final verdict on his method is not so unanimous as is at present hoped, yet it would seem quite certain already that a number of recent cases will yield to the treatment and it will remain to discover if possible which these are.

In brief, the idea underlying the method is that spontaneous detachment is caused by the formation of a hole or tear in the retina: that the fluid in front of the retina floats the retina off its bed and passes into the subretinal space: that a cure will be effected if the hole or tear is blocked up in some way, for the remains of the subretinal fluid will then be absorbed and the retina will remain *in situ*, unless another hole is in existence: that the best surgical method of blocking the hole is with the Paquelin cautery through a 2 mm. incision in the sclera.

The technique for the application of the hot metal to the proper point on the sclera is somewhat complicated, and involves careful work preparatory to operation. The details are to be found rather meagrely described in Gonin's paper at the Heidelberg Congress and in Vogt's article. The method has been recently applied at the Royal London Ophthalmic Hospital by two members of the staff who had visited Switzerland in order to see the routine in operation there.

Pre-operative details.—Prolonged search with the ophthalmoscope may be necessary to find a hole. If detachment has occurred with sudden onset, a hole is almost certainly present. A hole is most commonly found in that part of the retina which was first detached. It may be single or multiple, and may be shaped in various ways. It is found most commonly in the anterior part of the retina. The prognosis is best where the hole is single, small and anteriorly placed.

Locating the hole.—When found with the ophthalmoscope, it is advised to make two marks on the conjunctiva near opposite sides of the limbus with aniline gentian violet stain by means of a hypodermic needle; these marks are placed on the conjunctiva close to the limbus in ophthalmoscopic line with the hole: a further examination may need a readjustment, but, when satisfied, the observer tattoos the two spots with indian ink, to give a radial line pointing to the located hole for use at operation. It remains to

calculate the distance of the hole from the ora serrata and the limbus. It is reckoned that the extreme peripheral limit of ophthalmoscopic observation is almost at the ora serrata. (This is disputed, but is not far wrong.) A measure is taken ophthalmoscopically of the distance of the hole from the extreme peripheral limit of ophthalmoscopic vision, in terms of disc diameters. A disc diameter is 1·5 mm. The ora serrata is 8 mm. from the limbus (rather more in myopes). The necessary calculation may be shown by an example:—If the peripheral lip of the hole is 3 D.D. from the periphery, then the distance from the limbus is $3 \times 1{\cdot}5 + 8 = 12{\cdot}5$, say 13 mm. If the hole is $1\frac{1}{2}$ D.D. diameter, then its centre is 14-15 mm. from the limbus.

Operative Procedure.—This is carried out under local anaesthesia, with subconjunctival novocaine solution. A suture is inserted in the episcleral tissue close to the limbus on the conjunctival mark furthest from the hole. This is left long, so that it may be carried across the other mark on to the opposite sclera, to give the longitudinal meridian. The conjunctiva is divided and the sclera exposed clearly. The estimated distance is measured by dividers on the sclera from the limbus, and the site of the hole is marked along the line of suture by one prong of the dividers which has been dipped in stain. A 2 mm. radial incision with a Graefe knife is made at the site of the hole through the sclera and choroid, taking care not to enter so deeply as to damage the retina: the heated Paquelin cautery is plunged through the incision for a second or so: it is withdrawn, fluid emerges, and the conjunctiva is closed by suture. Both eyes are bandaged, and the patient is kept in bed for eight days.

At the end of that time the fundus is examined, and if the hole is closed a whitish mass is seen in its site, and the retina has for the most part returned to its bed on the choroid.

At the Holland Congress Gonin showed ophthalmoscopic sketches of the conditions before and after operation, and in his paper Vogt gave similar ones, which are well worth study.

Amsler and Dubois in their paper gave some suggestions for the location of the hole preparatory to operation, and described a chart on which the site may be conveniently noted for reference.

Dubois contributed a paper on traumatic detachment, and classified the latter into two main types, namely, (1) with a contusion rupture of the retina at the ora serrata, (2) from perforating wounds with contracting cicatrising bands. She reported several of these cases with interesting details, and concluded that the first type may yield to Gonin's cautery method, but that the second is less favourable, for a band is likely to be stronger than the cautery scar.

FRANK JULER.

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Amsler, M., and **Dubois, H.**—Topographie ophtalmoscopique et décollement rétinien. (Ophthalmoscopic localisation in detached retina.) *Ann. d'Ocul.*, T. CLXV, p. 667, September, 1928.

ABSTRACTS

I.—DISEASE OF LENS

(1) Siegrist, A. (Bern).—On the pathogenesis of senile cataract. (Zur Pathogenie der Cataracta senilis.) *Klin. Monatsbl. f. Augenheilk.*, Bd. LXVIII, S. 764, 1928.

(1) Reviewing the theories put forward to account for the occurrence of senile cataract, **Siegrist** first discusses the theory advanced by Hess and Römer, O. Becker, Peters, Possek, and others, who consider that, as a result of some abnormality in the body fluids, the aqueous humour becomes abnormal, thereby damaging, first the lens capsule, and later, the subcapsular lens fibres. Lesions showing an incidence suggestive of such an aetiology were claimed to have been demonstrated by Hess and Possek in cataracts produced by lightning, massage, naphthalene, tetany, and also in senile cataract. Vogt, on the other hand, from slit-lamp observations, adheres to the school which attributes a supranuclear origin to senile cataract, and believes it to be an expression of the wear and tear of age, beginning, as one would naturally expect, in the older, that is, the deeper lens fibres. By this origin, he claims that senile cataract may be differentiated in its pathogenesis from all cataracts of toxic origin, such as those due to naphthalene, sugar, tetany, etc., which have a subcapsular origin. Thirdly, an endocrine theory of origin is discussed which brings senile cataract into line with other cataracts whose pathogenesis is known to be due to a failure of the ductless glands, such as cataracts occurring in diabetes, myotonia dystrophica, status

lymphaticus, etc. Ductless glands are known to atrophy with age and it is suggested that in consequence mild toxins are retained in the blood, and that the lens, in common with the rest of the body, is influenced by their presence, an influence which is shown by the development of cataract. The author suggests, if this theory is correct and glandular deficiency is the cause of senile cataract, that by giving the active elements of the glands therapeutically the disease should be arrested. This he claims to have demonstrated with Dr. Streuli in 32 cases, using " Euphakin," a combination of parathyroid, thyroid, the sex glands and calcium lactate. At the same time he emphasises that this is a small number of cases on which to base any proof; nor does he claim " Euphakin " to be a certain and universal cure for cataract.

Against the " glandular deficiency theory " Vogt brings forward three objections:—(1) That age phenomena are uninfluenced by any treatment, and that senile cataract shares in this generalisation. (2) That there is an hereditary factor in senile cataract which also cannot be influenced by any agent. (3) Senile cataract by its supranuclear origin differentiates itself absolutely from all other so-called exogenous cataracts, such as those due to tetany or diabetes; it must therefore have a different pathogenesis.

Against these objections Siegrist brings forward the following arguments:—(1) The fact that by rejuvenation operations age processes are definitely influenced. (2) That hereditary factors depend ultimately upon the conditions in which they develop for their final characteristics. (3) That it is not an invariable rule that exogenous cataract begins in the subcapsular layers, and senile cataract begins in the supranuclear layers of the lens.

As examples he cites the cataracts associated with myotony and experimental tetany, which are known to begin sometimes in the supranuclear layers, and the senile posterior cataract, which begins in the subcapsular layers of the lens. Further, Siegrist holds that diabetic cataract is a typical exogenous cataract, and yet in young people it is subcapsular in origin while in old people it begins in the deeper layers of the lens. Vogt considers, on the other hand, that this last is really a senile cataract, and that in old people a true diabetic cataract does not occur. Siegrist's view is supported by the investigations of Goldmann who has shown that if rats are given sufficiently large doses of naphthalene to induce acute poisoning they develop superficial subcapsular lesions in the lens, but if small doses are given so that chronic poisoning results, a more deeply situated supranuclear cataract develops. It seems that when it is present in small doses the poison does not affect the capsule and the younger superficial fibres, the resistance of which is high, but only the deeper and older fibres, the resistance of which is

low. A similar explanation can be applied, in Siegrist's opinion, to the different types of cataract occurring in young and old diabetics, for it is well known that an acute form of diabetes tends frequently to occur in young patients, but rarely in old patients. The author finally concludes that he considers senile cataract to be due to toxins in the aqueous humour acting upon the lens; the site of the lesion depends upon the nature of the toxin; an acute and virulent toxin produces a subcapsular opacity while a more chronic and less powerful toxin gives rise to an opacity more deeply seated in the substance of the lens.

W. S. DUKE-ELDER.

(2) **Gaiser, Hans (Zürich).—The lens with double focus. (Die Linse mit doppeltem Brennpunkt.)** *Arch. f. Ophthal.*, Vol. CXXI, p. 145.

(2) This article, which **Gaiser** describes as a contribution to the study of progressive myopia in advanced life, gives particulars of nineteen cases of a condition of the lens to which different names and interpretations have been offered by various writers.

The designation which Gaiser here adopts is that used by his teacher, Vogt, who first demonstrated in several cases of lens with double focus the characteristic slit-lamp condition (corroborated by the present series of cases) of a " nuclear cataract with interval," *i.e.*, a clear interval between the opaque foetal nucleus and the surfaces of the adult nucleus.

In all the cases here recorded myopia was present, and in the majority it could be proved to be progressive. In four cases cataract extraction was performed, the subsequent refraction showing that the myopia had been due to the lens.

An important element for the change in the refraction is the increase in the curvature of the anterior and posterior surfaces of the nuclear cataract as compared with those of the lens.

This condition of the lens, which occurs more frequently in persons with axial myopia, gives warning against the assumption of a progressive lengthening of the antero-posterior axis of the eyeball, continuing throughout life, in axial myopia.

Attention is drawn to a point in the early symptomatology of this condition, viz., a frequent complaint of diplopia (monocular), more marked for distant vision than for near.

THOS. SNOWBALL.

(3) **MacCallan, A. F. (London).—Cataract** Westminster Hospital Reports, Vol. XX, 1929.

(3) **MacCallan's** paper gives a useful description of the various types of acquired non-traumatic cataract with excellent illustrations. He has found that " 33 per cent. of middle and upper class patients are affected as shown by ordinary focal illumination while

an additional 12 per cent. exhibit opacity when the slit-lamp is used." He then passes on to consider whether there is any pathological condition of the body which is invariably associated with cataract, and after a review of the various theories as to cataract formation, states that every case of lenticular opacity was found to have a condition of focal sepsis, usually in the teeth, tonsils or accessory sinuses. An interesting suggestion was made to him by Professor Elliot Smith; namely that there was a bare possibility of toxic material passing up within the sheaths of the dental nerves to the Gasserian ganglion and thence within the sheath of the ophthalmic division of the 5th nerve to any part of the eye. In his comments on some points in connection with cataract extraction, the author states that he has found intracapsular extraction a satisfactory operation, but, in the long run of cases, less safe than capsulotomy; he also expresses his disapproval of artificial maturation, of preliminary iridectomy, and of complete iridectomy at operation in special cases.

F. A. W.-N.

II.—THERAPEUTICS

(1) **Armstrong, W. E. M. (London).—Blepharitis successfully treated by an autogenous antivirus.** *Lancet*, September 15, 1928.

MacCallan, A. F. (London).—Blepharitis successfully treated by an autogenous antivirus. *Lancet*, September 22, 1928.

(1) **Armstrong** reports a case of severe blepharitis which was sent to him for bacteriological treatment. Out of four distinct bacteriological methods employed one only proved efficacious and led to "what appears to be a cure of the condition." Staphylococci were the only bacteria found in the material taken repeatedly from the inflamed areas. The first three methods, which failed, were:—(1) subcutaneous inoculation of stock polyvalent staphylococcus vaccine, (2) an autogenous vaccine, (3) a stock antivirus (Besredka). The patient became sceptical but consented to continue. An autogenous antivirus was prepared and applied in the form of a lotion which led to improvement within twenty-four hours, and to cure through persistent treatment.

MacCallan replied to the foregoing communication (which was contained in a letter to the Editor) inferentially suggesting that the case might relapse, and stating that during the last year every case of severe blepharitis seen by him in private and hospital practice had been found to be associated with gross focal sepsis. When

this had been dealt with, usually either by the dental surgeon or the throat surgeon, combined with mild local treatment, the blepharitis had been permanently cured.

ERNEST THOMSON.

(2) **Renard, Gabriel (Paris).—Polyvalent vaccine in ocular infections.** (**Les Vaccins polyvalents dans les Infections Oculaires.**) *Arch. d'Ophtal,* June, 1928.

(2) During the last three years **Renard** has employed a polyvalent vaccine in a number of diseases of the eye due to infection by known and unknown microbes. The composition of the vaccine is:

Gonococci -	3 milliards	per cubic centimetre
Pneumococci	- 3 milliards	
Staphylococci	- 3 milliards	
Streptococci -	- 1 milliard	
Club-shaped bacillus	500 millions	
Enterococci -	- 1 milliard	
B. Pyocyaneus	- 1 milliard, 500 millions	

Cultures of 48 hours are taken: each is exposed separately to the minimum temperature necessary to kill the micro-organism, and the resulting mixture put up in ampoules ready for use. "Two years' experience has shown us the efficacy of this vaccine and enables us to bring forward statistics of some importance." Their experience has been chiefly in cases of gonococcal infection: they have treated 17 cases in adults and 20 in the newly-born. The results recorded in the adult cases are very encouraging, 15 out of 17 cases having recovered without any corneal damage. In the cases of ophthalmia neonatorum the results were "analogous" but figures for the whole number treated are not given.

All the cases of purulent ophthalmia were treated additionally by local applications, consisting of frequent irrigation with permanganate of potash, and the instillation of nitrate of silver.

Renard has also used this vaccine in a number of intra-ocular infections, post-operative and accidental. He urges its employment in all such cases at as early a stage of the infection as possible. Clinical notes of some of the patients under his observation appear to maintain his claim.

J. B. LAWFORD.

(3) **Frydman, Mlle R. (Geneva).—Protein-therapy in ophthalmology.** (**La Proteinothérapie en Ophtalmologie.**) *Rev. gén. d'Ophtal.*, March, 1928.

(3) **Frydman** states at the outset that protein-therapy is both ancient and modern since it was employed in England in the

seventeenth century: for this statement she gives no authority. The method was adopted again in 1915 by Schmidt and has since been generalised. It was introduced into ophthalmology by L. Müller and Thanner in 1916. Under the name "Proteinkörpertherapie" the German authors understand the administration of albumens parenterally only, though some writers would include the buccal route. The author herself adopts the German meaning and her experience is with the intramuscular injection of Cibalbumine, a proprietary preparation from the Ciba laboratories. Before passing to her own cases some are cited from the literature, from which accounts one would be inclined to deduce that few acute ocular diseases are not benefited by the treatment. Coming to Frydman's own cases one is struck at once with the fact that it is not stated how many cases altogether have been treated. Fourteen case histories are given, namely, gonococcal conjunctivitis three, eczematous kerato-conjunctivitis one, serpent ulcer of cornea two, chronic ulcer of cornea one, iritis six, panophthalmitis one. One must suppose that these are cases selected from a much larger number, otherwise the results can hardly be considered conclusive, though nevertheless very suggestive. The conclusions may be given in slightly abbreviated form:—Ocular gonococcal infections are undoubtedly influenced for good. As to the other cases, especially iritis and serpent ulcer, the results vary. Iritis may benefit greatly, but results may be transitory and relapses frequent. In one case of serpent ulcer a cure resulted, in another it did not. In one case of panophthalmitis consecutive to an intra-ocular foreign body (extracted by magnet) the result was excellent (V.A., 1/4.) In a number of other cases of, *e.g.*, acute dacryocystitis, eczematous kerato-conjunctivitis and affections of the cornea following trachoma, the results are stated to have been "satisfactory." Apart from these formal conclusions one finds it stated in another part of the article that the treatment was employed as prophylactic in post-operative cases where infection was anticipated or where there was a slight infection such as iritis. The results in these cases were, apparently, doubtful. Some further remarks on the method in general are given, namely, that the intramuscular method is free from danger and can be employed without putting the patient to bed, that it is of great value as an adjuvant to local treatment, and that it gives remarkable results in a great number of ocular infections, but is not a panacea.

The author is to be congratulated upon her moderation of statement, but an analysis of the total number of cases treated would have been appreciated. The bibliography contains thirty-one names of authors and titles.

NOTE.—With regard to the author's statement that protein therapy had been employed in England in the 17th century she

says that various ailments were treated by intravenous injections of cow's milk but that the method was abandoned on account of the frequent occurrence of fat embolism. It would be interesting to know more about this early employment of the method.

ERNEST THOMSON.

(4) **Rieger, Herwich (Vienna). — Optochin as a prophylactic measure in serpigenous ulceration.** ("**Zur Stargardtschen Prophylaxe des Ulcus serpens mit Optochin.**") ***Zeitschr. f. Augenheilk.***, Bd. 67, S. 214, 1929.

(4) Optochin is used extensively in continental clinics for the treatment of pneumococcal conjunctivitis and corneal ulceration, and has been used by Stargardt since 1923 as a prophylactic measure against serpigenous ulceration. **Rieger** records his experience of this prophylactic treatment and concludes that it is an important addition to ocular therapeutics. He has analysed the cases under his observation in which an injury to the eye has led to infected ulceration of the cornea, necessitating in-patient treatment. About 2,000 cases of trauma were seen yearly for the last three years. During the first two years 13 cases (8 in one year and 5 in the other) led to the formation of serpigenous ulceration in spite of treatment; during the third year one per cent. optochin ointment was instilled as a prophylactic measure in all cases of trauma, and in that year there was only one case of corneal ulceration.

These records dealing only with in-patients do not show the full benefit that is derived from the prophylactic use of optochin, as there was also a considerable reduction of milder infections among out-patients. Of these milder infections, the records of the first two years (which were looked at in retrospect) are incomplete and therefore not comparable with the solitary case of mild infection seen during the third year (when optochin was used as a routine).

A. SOURASKY.

(5) **Marx, E., Mendes, E., da Costa-Vet, Naar, C., and Wolff, L. K.—On new substitutes for cocaine in ophthalmology.** (**Neue Ersatzmittel für Kokain in der Augenheilkunde.**) ***Klin. Monatsbl. f. Augenheilk.***, Bd. LXXXI, S. 433, 1928.

(5) A comprehensive investigation has been carried out by **Marx, Mendes, da Costa-Vet, Naar** and **Wolff,** into the relative values of cocaine and the many substitutes which from time to time have been suggested for ophthalmological work. The following substances were tested, and they were utilized both in acid form (as the hydrochloride) and in the basic (as the borate): cocaine,

novocaine, eucaine, tutocaine, psicaine, butyn, diocaine, isocaine, holocaine, stovaine, optochin, eukupin, eukupinotoxin. They were tested with reference to :—

1. Power of inducing anaesthesia.
2. Pain which follows from use.
3. Influence on the conjunctival vessels.
4. Effect on the pupil, the accommodation, and the height of the palpebral fissure.
5. Effect on the intra-ocular tension.
6. Effect on the cornea.
7. General toxicity.
8. Stability on preservation and sterilization.

The physical properties of the drugs were also examined.

The results which emerge from the investigation demonstrated clearly that none of its substitutes or derivatives can efficiently supplant cocaine itself, apart from the fact that on subcutaneous injection it has a considerable toxicity. Most others are more painful, and most of them dilate the blood vessels. In general the basic drugs are the more efficient. Incidentally it appears that atropine combined as a base (atropine borate) is much more efficient than as an acid salt (sulphate), a 0·25 per cent. solution of the former having approximately the same efficiency as 0·75 per cent. of the latter, as measured by the light reaction. Similarly, pilocarpine in basic form is twice as effective as in the acid form as measured by its effect on the ciliary muscle by the distance at which small print was readily legible.

W. S. DUKE-ELDER.

III.—MISCELLANEOUS

(1) **Bücklers, Max** (Zürich).—**Anatomical investigation of the connection between senile and myopic circumpapillary atrophy of the choroid. (Anatomische Untersuchungen ueber die Beziehungen der senilen und der myopischen circumpapillaren Aderhautatrophie.)** *Arch. f. Ophthal.*, Vol. CXXI, p. 243.

(1) **Bücklers** examined microscopically the eyes of seven non-myopic persons of very advanced age, together with those of one case of extreme anisometropia (M.=25.OD.), and found that the senile variety of circumpapillary atrophy of the choroid (Bügel) in non-myopic persons shows anatomical changes (atrophy of the choroid, degeneration of the choriocapillaris, and in particular the development of spaces, like tears, in the lamina vitrea of the

choroid, atrophy and proliferation of the pigment epithelium, etc.) similar to those which have been adduced as proof of a mechanical cause of atrophy of the choroid in myopia.

Hence he concludes that the views, based on these anatomical changes, that the choroidal atrophy in myopia is the result of a mechanical stretching or pressure, are no longer tenable.

Near the optic papilla he also found cystoid degeneration of the layers of the ganglion cells and nerve fibres, together with fatty degeneration of the vitreous lamina and the sclerotic. The conditions found also explain why the tears in the vitreous lamina and the choroidal changes above described, that were attributed to myopic stretching, do not appear till long after the termination of the growth of the eyeball (and therefore cannot be the result of stretching).

The signs characteristic of senility and of myopia progress as age advances, and like all senile changes are subject to the influence of heredity.

Bücklers points out the fact that there are families in which the refraction of the members is the same, but some show atrophy of the choroid and others are free. To this category belong the cases of anisometropia, where the one eye shows emmetropia or hypermetropia, and the other an axial myopia of 1 to 30 or more D.

In these cases the emmetropic eye does all the work, while the progressively myopic eye is generally in a position of divergent strabismus, and takes no part in fixation. Yet this relatively inactive eye passes through all the phases of degeneration of progressive axial myopia: from circumpapillary atrophy and macular degeneration associated with haemorrhages to degeneration of the peripheral parts of the fundus and vitreous, and retinal detachment. The other eye, however, which alone does all the work, remains healthy and emmetropic.

Cases of this kind prove the untenability of all theories of a mechanical cause of myopia, and admit of the only explanation that both in myopia and in myopic degeneration signs of an inherited taint are present; which brings the myopic degeneration into line with the inherited characteristics of senile changes as described by Vogt.

THOS. SNOWBALL.

(2) Tron, Eugen (Leningrad).—A contribution to the chemistry of the re-formed aqueous humour. (Ein Beitrag zur Chemie des regenierten Kammerwassers.) *Arch. f. Ophthal.*, Vol. CXXI, p. 329.

(2) This record of an experimental research by **Tron** gives particulars of the albumen and chlorine content, as well as the amount of calcium and potassium, in the first and secondary, or re-formed, aqueous humour.

He discusses various views as to the causes of the changes in the chemical composition of the aqueous, and summarises his results as follows:

1. In comparison with the first aqueous, the re-formed shows an increase in the cation content (Ca. and K.) and a diminution in the anion concentration (Cl.).

2. Ascher's rule (that a rise in the albumen content in the aqueous is accompanied by a fall in the chlorine) holds good under the most varied experimental conditions (paracentesis of the anterior chamber at different intervals, paracentesis in full-grown, and in young animals, and puncture after subconjunctival injection of pituitrin).

3. As to chemical composition, both the first and the second aqueous can be regarded as an ultrafiltrate of the blood (" dialysate " of Duke-Elder. T.S.) The differences between the two can be explained by the increased permeability of the capillary walls for the colloids of the blood setting in towards the anterior chamber as a result of the dilatation of the vessels of the ciliary body. The differences in the anion- and cation-content in the first and re-formed aqueous are due to this increased permeability of the vessel walls, and are dependent, on the one hand, on the breakdown of Donnan's equilibrium normally existing between the aqueous and the blood serum, and, on the other, on the passage into the aqueous of those portions of the crystalloids that are combined with the colloids of the blood, and hence are usually not dialysable.

THOS. SNOWBALL.

(3) **Yoshimoto, Ryotsui (Japan).—Contribution to the problem of avitaminoses of the eye. (Beitrag zur Frage der Avitaminosen des Auges).** *Arch. f. Augenheilk.*, Bd. XCIX, May, 1928.

(3) 1. *Hemeralopia and vitamin deficiency.*—This investigation was at first carried out on rats under Sugita's experimental conditions of diet, etc., somewhat modified, and the relationship between avitaminosis and keratomalacia established with greater certainty than by Sugita. But as it was found impossible for reasons given to confirm the occurrence of hemeralopia in avitaminous rats, **Yoshimoto** experimented with the well suited domestic fowl which, as soon as absolute darkness is relieved by a certain amount of light, begins to peck for food. It could not be established that the avitaminous fowl suffered from hemeralopia.

2. *Cataract and vitamin deficiency.*—A connection between cataract and vitamin deficiency was held by von Szily and Eckstein to be established by their experiments on rats. Although Yoshimoto repeated the research of von Szily

and Eckstein precisely in every detail, in no case could he find either a lamellar or a complete cataract or even any permanent lens opacity. What he discovered was that the lenses of rats get cloudy in low temperatures; this property is most marked in the youngest rats and goes on decreasing with age. The opacification of the lens produced by cold persists only up to 10 days in normal rats kept at 20°C.; in avitaminous rats from 15 to 25 days according to the diet they have been on. Even at lower temperatures the lens clears under all diets, but the difference in the time of clearing between normal and avitaminous rats remains constant. If one watches the gradual development of opacification under the influence of cold, one can see clinicaly all stages from commencing dullness to almost complete cataract. Pictures are given of lenses taken out and examined after being subjected to various degrees of cold from 5°C. to 18°C.

D. V. GIRI.

(4) **Franceschetti, H. and Wieland H. (Basle).—Quantitative determination of the albumen-content of intra-ocular fluids by means of the nephelometer. (Quantitative Bestimmung des Eiweissgehaltes der intra-okularen Flüssigkeiten mit dem Nephelometer.)** *Arch. f. Augenheilk.*, Bd. XCIX, May, 1928.

(4) At the outset **Franceschetti** and **Wieland** discuss critically the methods hitherto employed—refractometry, viscometry, precipitation, surface tension—and claim for nephelometry, which they describe, much greater accuracy. They modified the nephelometer to suit their purpose and the results of their investigations are as follows:

1. The albumen-content of the rabbit's aqueous averages at about 0.05 per cent., vitreous 0.012 per cent.

2. In the rabbit with congenital hydrophthalmos the albumen-content is higher; for the aqueous the average is 0.13 per cent., for the vitreous 0.021 per cent.

3. The second tapping of the aqueous and vitreous shows great access of albumen, which is maintained in the aqueous for a week and in the vitreous for several weeks.

4. In the hydrophthalmic eye of the rabbit the return to normal is more delayed.

5. In man, the albumen-content of the normal aqueous varies between 0.019 per cent and 0.034 per cent.

N.B. The cases investigated were mostly elderly people with cataract or optic atrophy. The authors make no mention of the general condition of the patients.

6. The secondary aqueous in man invariably shows increased albumen-content, even when in the primary aqueous there was already a marked increase.

7. In acute glaucoma (primary and secondary) the aqueous

invariably shows an increased albumen-content (0.213 per cent. to 0.457 per cent.); in the secondary aqueous it may amount from 0.474 per cent. to 0.767 per cent.

8. In congenital hydrophthalmos in man the increase of albumen in the primary aqueous is even higher (0.782 per cent. to 2.37 per cent.). The quantity of albumen in the secondary aqueous (2.86 per cent. to 3.2 per cent.) corresponds to what otherwise is found only in the secondary aqueous of the rabbit.

D. V. GIRI.

BOOK NOTICES

Ofthalmologický Sborník. Collection of Papers read before the Fourth Congress of the Czechoslovak Ophthalmological Society, 1929. Published by the Society, Prague, 1929.

The Report of the 3rd Congress of the Czechoslovak Ophthalmological Society, held in 1928, appeared in 1929, and was noticed in this journal, December, 1929. That of the 4th Congress of this Society, held in 1929, has now reached us. It is a much smaller volume: 187 pages as against 578. With kindly consideration for the foreigner résumés in French, English and German are given of 26 of the 30 papers contained in the volume, and occupy the first 30 pages thereof.

A considerable proportion of the papers are statistical, pertaining to observations on various ocular diseases over a period of ten years or so, in ophthalmic clinics of the country. Zahor (from the Workmen's Accident Insurance point of view) discusses the problem of detachment of the retina in accidental injuries to the eye and emphasises the difficulty of excluding detachment due to disease in such cases, of which he cites examples.

In 112 cases of detachment of the retina, Würz found a history of previous injury in 34 (excluding 4 as uncertain). In 8 the traumatic origin was doubtful though possible: in 11 the detachment was clearly due to injury: in one it followed concussion from a fall on the back of the head. The results of treatment were unsatisfactory; cure in two cases, improvement in two.

Mrazova and Vejdovsky both report cases of injury to the eyeball and lids by ink-pencils, followed in two instances by necrosis of corneal and conjunctival tissue and in one by severe iritis.

Ptelen, investigating 50 cases of rupture of the sclerotic, observed during ten years, reports a " good result " in only 2 per cent. Würz, at the Brno Ophthalmic Clinic, reports 6 cases of " juvenile haemorrhage in the vitreous " : 5 males, 1 female, the ages between 14 and 32 years. While under observation retinitis proliferans developed in one patient and Coats's type of retinitis in another.

Aetiologically 2 cases were considered as undoubtedly, and 4 cases as probably, tuberculous.

Kadlicky constructed curves showing the seasonal frequency of diseases of the eye, over a period of 9 years. The total frequency is greatest in the spring, 30 per cent.; in summer 25 per cent.; in autumn 23 per cent.; in winter 22 per cent. The fluctuations of individual disease are generally analogous; glaucoma shows its maximum in February. Gala writes concerning 6 cases of " cancer of the lids and conjunctiva " treated by " electro-coagulation," with which method he has obtained satisfactory results.

Mrazova treated 12 cases of interstitial keratitis by malarial inoculation combined with antisyphilitic medication. In only two instances was there notable improvement.

The remaining papers are mainly clinical records of rare disorders, *e.g.*, plexiform neuroma, disciform keratitis, melanotic myo-sarcoma of the orbit, congenital anomalies, etc.

Pathology of the Eye. By JONAS S. FRIEDENWALD. Pp. 314. Illustrated with 253 figures. London: Henry Kimpton. 1930. Price, 21/-.

This is a comparatively short book and the general plan of it is " to group together the reactions of the various parts of the eye to similar injuries and disease processes . . . whenever possible aetiology and pathogenesis have been emphasised."

The author is an entertaining writer who takes a wide view of his subject with the result that his work is eminently readable. It is delightful for instance in a description of focal lesions to read how an uninitiated student of the literature " might easily be led to suppose that in Germany and elsewhere on the continent, tuberculosis is quite a different sort of disease from that which we find in this country, while on the other hand, the teeth and tonsils of the British and American people were in some obscure way stimulated to most malicious behaviour." There are no fewer than 253 illustrations many of which are admirable and of great interest. They all appear to be microphotographs, and while " the camera cannot lie " it cannot always tell the whole truth and in some cases a drawing, even though partly diagrammatic, would have served the purpose better. A notable example of this is Fig. 71 on page 92, which represents a section of the cornea in interstitial keratitis, showing nothing which could be construed as characteristic of the disease. As a contrast to this, nothing could be clearer than the illustrations on page 11 of colloid excrescences on Descemet's and Bruch's membrane and on the lens capsule.

As would be expected there is much in this book on the subject of focal infections, which are described as causing subacute endophthalmitis, and an interesting description is given of how large mononuclear cells agglutinate in the sheaths of the retinal

vessels, become epithelioid in appearance and lead to an erroneous diagnosis of tuberculosis from their resemblance to giant cells. Again the type of cell responsible for the formation of keratic precipitates is shown to have a relation with the clinical appearance of the cornea; polymorphs, having no tendency to agglutinate, form very fine precipitates, lymphocytes, with more tendency to agglutinate, form a coarser precipitate, while the "mutton fat" precipitates are those in which large mononuclear phagocytes predominate. An interesting suggestion is made in the section devoted to cataract, namely that the senile variety of this disease may in some cases at least result from an exaggeration of the normal senile decrease in capsular permeability. In the description of glaucoma, it is suggested that the primary cause of an acute attack is a local vasomotor crisis, manifesting itself especially in an increased permeability of the capillaries of the ciliary processes.

These quotations will show that there is much to interest the ophthalmologist in the pages of this book, but on the other hand there are notable omissions and we trust the author will not take it amiss if some of these are mentioned. In dealing with sympathetic ophthalmitis, no mention is made of large mononuclear leucocytosis. Vossius' ring is not mentioned as a sequel to concussion injuries, and the association of horizontal ridges on the teeth, convulsive fits and probable parathyroid insufficiency is not referred to in the description of lamellar cataract. In the discussion of the mechanism of production of choked disc, increased venous pressure is dismissed on the grounds that choked disc is very rare in thrombosis of the cavernous sinus and there is no reference to the opening up of other anastomotic channels in this condition. Also there is no mention of the theory of Paton and Gordon Holmes as to how in cases of raised intracranial pressure, the central retinal vein is exposed to pressure from without while it is crossing the subdural space of the optic nerve and thus oedema of the nerve head is brought about.

Omissions, however, are always easy to detect, and no one who reads this book can help feeling that the author has made a notable addition to ophthalmic literature. Moreover many will also feel that he has helped to clarify our ideas about various points in the pathology of eye diseases.

Studies in the Psychology of Reading. By M. D. VERNON and R. W. PICKFORD. Pp. 59. 13 tables. London: His Majesty's Stationery Office. April, 1929.

This publication follows on one published in 1926 on the legibility of type, since the committee had recommended a series of studies on the mental processes involved in reading whole sentences and words rather than isolated letters. In both Vernon's and Pickford's work, the reading material was exposed for a short period of

time in a tachistoscope. The former observer classifies the mistakes into three categories, typographical, meaningful and mixed. The typographical errors were at a maximum when reading groups of three disconnected words while the meaningful errors were at a maximum in reading the long sentences, the mixed errors being at a maximum in reading connected prose. The substitution or omission of the letters occurred in the middle of words rather than at the beginning or end, and the contour of the words, as shown by the relative heights of the letters was more important for their apperception than their horizontal extension. When the meaning of the material read was fully comprehended, typographical errors were few. When it was not understood unfamiliar words were replaced by far more familiar ones of a somewhat similar form or by very much shortened words or by nonsense combinations. With regard to individual differences it was found that those who had a wide and accurate perceptual span in the reading of meaningless material did not have more than an average span in reading the meaningful material. The best readers relied more upon interpretation in accordance with meaning than upon wide perceptual span and objective accuracy.

Pickford's work, which forms the second part of this publication, was an attempt " to investigate the relationship between the flow of perceptual processes and the flow of meaning in reading." In a given passage a certain " set " of meaning was formed in the subject's mind and in a subsequent similar passage, complications were introduced into the reading matter which would be out of accordance with that meaning. An attempt was then made to observe in what way the effect of the first passage altered the nature of the reactions to the subsequent ones. The results obtained were not very conclusive and the author would prefer to dispense with the tachistoscope and use another method for further investigations.

Fifteenth and Sixteenth Annual Reports of the Ophthalmic Section of the Department of Public Health, Egypt. Government Press, Cairo.

These publications have now been brought up to date by the printing of the Reports for the years 1927 and 1928. The number of ophthalmic hospital units in the country at the end of 1928 was 41, of which 27 are permanent built hospitals, and 14 are travelling hospitals under canvas.

Photographs of two new hospitals which have been built at Asswan, in Upper Egypt, and at Rod-el-Farag, in the suburbs of Cairo, are shown.

A colossal amount of clinical work was done at this unique system of hospitals during 1928. More than 171,000 operations were performed; these included about 2,000 cataract operations, more than 1,000 decompression operations for glaucoma, and 60,000 operations for entropion.

Tafeln zur Binokularen Untersuchung des Gesichtfeldzentrums mit dem Stereoskop. By ERNST HAITZ (Mainz). Seven charts with explanatory pamphlet. Fourth edition. München: J. F. Bergmann. 1929. Price, M.6.60.

Haitz's charts for mapping out small para-central scotomata (within a range of 10° from the fixation spot) make possible one of the simplest stereoscopic methods in use, the only other apparatus necessary being a stereoscope of the Holmes type and, of course, coloured test objects. The advantages of the stereoscopic method are best seen in cases of monocular scotomata. Accurate fixation may be difficult in such cases as soon as the good eye is occluded and small scotomata may easily be overlooked in examining an unsteady eye.

A German text of ten pages accompanies the charts and gives a full explanation of the principles and application of this method, which is widely used in Germany.

The present edition differs in no way from the last.

Sammlung Stereoskopischen Bilder von Augenheilkrankheiten (First Series.) By A. VON RÖTTH (Budapest). Pp. XVIII+30, 6½ in. × 4¾ in. Fifty stereophotographs, 13 cm. × 6 cm., with explanatory text in German, English and Magyar. Budapest: "Studium." 1929. Price, R.M.20.

Stereoscopic photographs as illustrations of pathological lesions are of necessity of greater value in ophthalmology than in most other clinical subjects, for to the oculist, the level of a lesion is even more important than its shape and size. In an ordinary photograph it may be difficult to determine whether a particular lesion is an opacity of the cornea or of the lens; in a successful stereoscopic photograph such difficulties do not arise, and von Rötth's collection is a convincing plea for the value of such pictures. The present series of fifty represents a first instalment: they are everything such photographs could possibly be, and except for the fact that they do not show natural colouration, give an extremely life-like appearance.

The author's aim has been to supply illustrations of the more common conditions and to provide photographic records of rare and interesting cases, though most of the illustrations are essentially for teaching purposes. In this country lantern slides and coloured drawings have been used largely for this object and also for the representations of rare conditions. von Rötth's collection shows that stereoscopic photography has some advantages well worth considering. One of the photographs is an illustration of a congenital tarsal fold which could hardly have been brought out as effectively by a non-stereoscopic illustration.

The photographs were taken with the Drüver camera (Carl Zeiss). (An article on the subject of stereophotography of the eye appeared in this journal, Vol. IX, p. 512.)

CORRESPONDENCE

A HINT TO THE PRESBYOPIC RETINOSCOPIST

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIR,—This note deals with a commonplace subject. How does a presbyopic, and especially an astigmatic presbyopic retinoscopist, obtain a sharp view of the shadow and, at the next moment, decipher the number of the trial lens he is using or requires to use, or make memoranda on note book or case-sheet?

My own experience is this. I have worn cylinders since early in professional life, and in due time sphero-cylinders in bifocal form. Eventually it came about that if I employed my ordinary bifocals for retinoscopy the shadow was not sharply defined with either the distance or the near portion and, in addition, the line of junction was constantly coming in the way. If no glasses were worn the case was worse, because neither the shadow nor the lens numbers could be clearly seen, while if a note were possible to write probably it could not be read when required. Some fifteen years ago the combination of presbyopia and astigmatism became so troublesome, at a time when retinoscopy formed a very large part of my work, that I had to get over the difficulty somehow or other. This was done by means of a special pair of retinoscopy glasses. The right lens is single and designed exactly to focus the shadow at my own working distance and is altered in strength as required by the years. The left lens is bifocal for distance and near. One might suppose that this arrangement would prove uncomfortable for all purposes other than retinoscopy, but, in my own case at any rate, this has not been such as to outweigh the great advantages of being able to do the retinoscopy and to see to write and read without changing glasses. Headaches have not been caused to any appreciable extent. Naturally, should it be necessary to examine an eye, or anything else, critically, with binocular vision, one must change glasses but, in the course of say, a morning's refraction the occasional change required is as nothing to the repeated change which is otherwise necessary.

Yours truly,

ERNEST THOMSON.

STIRLING.

NOTES

Appointments

MR. LESLIE PATON has been elected a Vice-President and consulting ophthalmic surgeon to St. Mary's Hospital.

Mr. F. A. JULER and Mr. F. A. WILLIAMSON-NOBLE have been appointed ophthalmic surgeon and assistant ophthalmic surgeon, respectively, to St. Mary's Hospital.

Mr. R. C. DAVENPORT has been appointed assistant surgeon to the Royal London Ophthalmic Hospital.

Mr. D. STENHOUSE STEWART has been appointed hon. assistant ophthalmic surgeon to the Hull Royal Infirmary.

* * * *

Honour

AMONG the New Years Honours we are pleased to see that a C.I.E. has been conferred upon Lieut.-Col. W. V. Coppinger, I.M.S.

FUTURE ARRANGEMENTS

1930

February 4.—Midland Ophthalmological Society, at Birmingham.
February 7.—North of England Ophthalmological Society, at Newcastle-on-Tyne.
February 13.—Annual Dinner of the Royal London Ophthalmic Hospital.
February 14.—Section of Ophthalmology, Royal Society of Medicine.
March 7.—North of England Ophthalmological Society, at Liverpool.
March 14.—Section of Ophthalmology, Royal Society of Medicine, (Clinical Meeting.)
March 28.—North of England Ophthalmological Society, at Sheffield.
April 1.—Midland Ophthalmological Society, at Wolverhampton.
April 2-5.—Ophthalmological Society of the United Kingdom, Annual Congress.
June 3.—Midland Ophthalmological Society, at Worcester.
June 13.—Section of Ophthalmology, Royal Society of Medicine. (Annual Meeting.)
July 10-12.—Oxford Ophthalmological Congress, at Oxford.
October 7.—Midland Ophthalmological Society, at Birmingham.
December 2.—Midland Ophthalmological Society, at Birmingham.

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *December, 1929.*

SWAB. The status of food poisoning in relation to ophthalmology.
HORNER and CORDES. Congenital coloboma of the upper eyelid with dermoids on cornea.
JACKSON. Causes and prevention of blindness in Colorado.
BEGLE. Perforating injuries of the eye by small steel fragments.
FINNOFF. Dendritic keratitis following therapeutic inoculation of malaria.
SHANNON and MOHLER. Lipemia retinalis in a diabetic.
LAQUEUR. History of my glaucomatous illness.

Archives of Ophthalmology. *November, 1929.*

HOLLOWAY and FRY. Asteroid hyalitis; report of a case with microchemical and histologic observations.
COHEN. The eye in diabetes mellitus.
TOOKER. Allergic phenomena in tuberculous keratitis: report of two cases.
BENEDICT. Retinoblastoma in homologous eyes of identical twins.
HECKEL. Complete exenteration of the orbit, by means of electrocautery, for neglected epithelioma of the eyelids: report of a case.
LANGE. Haemorrhages in the fundi in hypertension.
GOLDBACH. Eye symptoms and the Parkinsonian syndrome.
YOUNG. Homonymous hemianopsia during pregnancy aided by reflecting prism.
BLAKESLEE. Eye manifestations in fracture of the skull.
BROWN and DUMMER. The experimental production of iritis.

Annales d'Oculistique. *November, 1929.*

BERENS. Diagnosis of raised intracranial tension in the absence of papilloedema by means of a study of retinal arterial tension.
MURA. Contribution to the study of epitheliomata of the cornea.
AMSLER. Clinical and anatomical remarks on perforating thermocauterisation.
DUFOUR. The astigmatic pencil and the three equations of Sturm.
——— On the relation between the strength of the correcting lens and its position.
HUDELO. Glaucoma and facial naevus.

Archives d'Ophtalmologie. *November, 1929.*

TERRIEN and FAVORY. Circumscribed abscesses of the sclerotic.
BOURGUET. Pituitary puncture, the procedure of Simons-Hirschmann and our own.
CHARAMIS. Abnormal forms of Marcus Gunn's phenomenon.
PERRIN. Subconjunctival injections of neutral sulphate of atropine in ocular therapeutics.
DEVERGER. Technique for avoiding haemorrhage during excision of the lacrimal sac.

Revue Générale d'Ophtalmologie. *April, 1929.*

GABRIÉLIDÈS. Intravitreous cysticercus.

June, 1929.

BRUCKNER and KNAPOVÀ. Exogenous argyrosis of Descemet's membrane and the elastic lamina of the cornea.

Archiv für Augenheilkunde. *December, 1929.*

WEGNER. New considerations on pulsatile movements of the human eye and its coverings.
HAGEDOORN. Contribution to the embryology of the eye.
SONDERMANN. Contribution to the occurrence, physiology and pathology of the intra-ocular tension.

FISCHER. On gaseous interchange between the cornea and the air.
KLARE. Clinical observations on the operative treatment of cataract in children.
TAGAWA. On the condition of the superficial layer of the cornea after division of the trigeminal.
KOLEN. On chromotropism in the connective tissue of the eye.
BOENTE. Deposit of calcium in the lens.
AHLENSTIEL, HEINZ, SACHS and STRECKFUSS. The use of colour filters in colour blindness.
LEVINSOHN. Further criticisms on the genesis of myopia.
VOM HOFE. Hypertonia and compensatory hypotonia in the eye.
ZIKULENKO. Physical schema of certain appearances in spatial perception.
LIU PAU HUA. Silvering of the cornea and glaucoma from occupational argyrosis.
BALÁS. On the histology and pathology of thrombosis of the central vein.
GUILLERY. Appreciation and further use of the method of tubular grafting in pathological conditions of the eye.
OHM. Ring-like sloughing of the cornea in both eyes from diplobacillus liquefaciens (Petit).
LYRITZAS. Observations on the treatment of trachoma.
VELHAGEN. A case of unilateral hypoplasia of the optic nerve in a previously normal eye.
LEVINSOHN. On discission of secondary cataract.

Archiv für Ophthalmologie. *December, 1929.*

CORDS. On the pathology of guiding movements.
BLATT. Phlebotomy and glaucoma.
LINDNER. A new method of orientation of position in the fundus and its use in Gonin's method of treatment of detachment of the retina.
SALZMANN. Intra-ocular localisation.
MITA. Experimental investigations in cavernous atrophy in excessively stretched optic nerves.
JOHN. The practical use of Nervocidin as an analgesic and antiseptic and as a means of lowering the intra-ocular tension.
HORNIKER. On a form of central retinitis of angio-neurotic origin.

Klinische Monatsblätter fur Augenheilkunde. *December, 1929.*

TRENDELENBURG. On the diagnosis of abnormality of the colour sense.
HERRENSCHWAND. On alterations in the fundus in tuberous sclerosis of the brain.
BUSACCA. Anatomical and clinical observations on the zonular lamella and its loosening from the lens.
PELLÁTHY, B. VON. Experimental researches on the introduction of drugs into the anterior chamber.
WAARDENBURG. A new example of an asymmetrical developmental defect: congenital limitation of eye movement without ptosis, hyperplasia of the plica semilunaris, enophthalmos with vertical shortening of the palpebral fissure.
REIS. Gas bubbles in the anterior chamber. A new differential diagnostic sign in metastatic coli endophthalmitis in diabetes.
PAPOLCZY. On plasmoma of the conjunctiva with special reference to trachoma.
MITA. On eye affections in sulphur miners.
GERLACH. On a mixed tumour of the eyebrow.
BETSCH. Bilateral ophthalmic atrophy (Leber's type) after trauma.

Zeitschrift für Augenheilkunde. *December, 1929.*

BIRCH-HIRSCHFELD. On tonometric judgments of glaucoma.
MYLIUS. Observations on tumours in the region of the pituitary.
RIEGER. On a case of tapeto-retinal degeneration with cone-like formations at the macula.
STIEF. Histopathology of the optic nerve in arterio-sclerosis and senile dementia.

Archivio di Ottalmologia. *September-October, 1929.*

CORRADO. On a case of metastatic carcinoma of the choroid with extra-ocular extensions
GUERRA. Spring catarrh.
DI FEDE. Can the method of Kleczkowski be used for the differential diagnosis between traumatic and follicular conjunctivitis.
SALVATI. The employment of tracolisina in the treatment of ocular leprosy.

Archivos de Oftalmologia de Buenos Aires. *October, 1929.*

LUQUE. Acetylcolina in certain ocular syndromes.
PUIGGARI. Visual changes in serious haemorrhages.
BARBIERI. The luminous visual field and the pupillary reflex. Objective perimetry, its clinical importance. A new pupilloscopic perimeter.
SATANOWSKI. Absence of abduction or congenital muscular strabismus of Lagleyze.
MALBRÁN and MOULIÉ. Detachment of the retina treated surgically.
FORTIN. Some notes on detachment of the retina.

Revista Oto-Neuro-Oftalmologica y de Cirurgia Neurologica.

September, 1929.

MARQUEZ. On the double innervation of the internal rectus muscle.

Archivos de Oftalmologia Hispano-Americanos.

November, 1929.

GUIRAL and VIONDI. Why do the great majority of oculists not practise the method of cataract extraction by means of the suction apparatus?
PAVIA. Radio transmission of photographs of the fundus of the eye.
ESTEBAN. Operative method for palpebral ptosis.

December, 1929.

CASTRESANA. Glaucosan in glaucoma.

Boletin de Información Oftalmológica. *March-April, 1929.*

ONETO. The pathogenesis of the Argyll Robertson pupil.
SORIANO. Total extraction of the lens.
DAMEL. Congenital distichiasis.

Revista Cubana de Oftalmologia y Oto-Rino-Laringologia.

December, 1929.

GUIRAL and VIONDI. Secondary cataract and its complications. Procedures for avoiding these.
FERRER. Secondary cataract and its complications. Procedures for avoiding these.
YANES. Considerations on trachoma in Cuba.

Revista Oto-Neuro-Oftalmologica. *September-October, 1929.*

RAVERDINO. Contribution to the study of cranio-pharyngeal tumours with supra-sellar extension.
AGNELLO. On five cases of ophthalmoplegic migraine.